

MODIS

Science Data Processing Software

Version 4.0 System Description



Volume II – Section 4

May 2004

SDST-119B

MODIS
Science Data Processing Software
Version 4.0 System Description

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Change Record Page

This document is baselined and has been placed under Configuration Control. Any changes to this document will need the approval of the Configuration Control Board.

Document Title: MODIS Science Data Processing Software Version 4.0 System Description			
Document Date: March, 2003			
Issue	Date	Page Affected	Description
REVIEW DRAFT	3/25/99	All	Baseline
FINAL REVIEW	5/20/99	All	Baseline
REVISION A	6/30/01	All	Baseline
REVISION B	5/31/04	All	Baseline

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Volume II – Sections 4

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MODIS

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4. PRODUCT GENERATION EXECUTIVES

The following sections contain a more detailed description for each of the MODIS PGEs with an emphasis on the data processing aspects. An abbreviated subset of the structural information, input and output data sets, and processing parameters are shown in Table 3-2. All of the data processing descriptions use the MODIS Terra product names. The data processing for Aqua is expected to continue to be identical to the data processing for Terra. There may be some differences in the PGE code for Terra and Aqua processing and a few differences in input products, but the production rules and scenarios are expected to be the same. Any differences are noted in the PGE descriptions. Additional details about the input and output files are shown in Tables 3-3-1, 3-3-2, 3-4, 3-5, and 3-6. For both input and output MODIS products, only the Terra ESDTs are shown in this document. In the ESDT ShortName a substitution in the first two characters of “MY” for “MO” will convert the Terra name to the Aqua name. In the ESDT LongName a substitution of “Aqua” for “Terra” will convert the Terra name to Aqua name. For PGEs using the ephemeris data and attitude data, the Aqua ephemeris and attitude ESDTs are named and the data processing is described where necessary because there are some significant differences between Terra and Aqua.

Some of the PGEs also make combined Terra plus Aqua products. A substitution of “MC” in the first two characters of the ESDT ShortName will convert the ShortName to the corresponding combined product. Most of the Oceans Level 3 and Level 4 PGEs will produce combined Terra plus Aqua products, but not all of the Oceans parameters will be made. Land PGEs that make the combined products may omit the Aqua products, but most of them will still maintain the capability of making them in the future. No Atmosphere combined products have been planned as yet.

Over the past year browse products have been added to some of the PGEs. The browse products are generated by processes that are common to the MODIS Science Disciplines. These browse products are especially helpful to science data users who order products from the DAACs. ECS has currently only provided the capability of linking one browse product to one science product. In the future ECS may provide the capability of linking a browse product with multiple science products. All browse products are stored in one ESDT Collection at the DAACs. This collection has the ShortName of BROWSE. The individual file names identify a particular browse product and its associated science product. The file name is composed of “BROWSE “ followed by the science product name. The MODIS PGEs that have browse products make them for one or more of their primary output science products.

The individual PGE descriptions assemble the information from the SDD tables and provide additional details that are required to integrate and test the PGEs and build a data production scenario for operations. The ECS Production Rules available for Release B.0 are used in processing MODIS Level 1 PGEs at the GES DAAC. MODAPS also uses most of the ECS Production Rules in processing MODIS Level 2 to Level 4 PGEs. MODAPS has implemented additional Production Rules that were requested by the MODIS Discipline Groups for the execution of their PGEs. All of these Production Rules are listed in Appendix C. Although many of the ECS Production Rules are the same as the MODAPS Production Rules, the implementation in the data processing system is different. The construction of the production scenario from the basic, available production rules is described in Section 5.

4.1 Level 1A Raw Radiances and Geolocation (PGE01)

PGE01 performs the MODIS Level 1A (L1A) processing, which is done on a semi “real-time” basis with each Level 0 input file containing two hours of data. The GES DAAC runs PGE01 as 15 minute Data Processing Requests (DPRs). This results in 96 runs of this PGE per day executed at the GES DAAC. Each output data granule covers a period of five minutes. The PGE nominally outputs 288 granules of each product per day. The L1A product contains scan and pixel quality data, engineering data, and discarded packets. The Geolocation product contains geodetic position for the center of each 1 km MODIS Earth view observation for the ideal band 0* and other information sufficient to permit adjustment of the geolocation for specific real bands and sub-pixel ground location.

Purpose

PGE01 converts raw (Level 0) data into reconstructed earth-located instrument data.

Structure

PGE01 is comprised of two sequential processing steps: L1A processing (MOD_PR01) and Geolocation processing (MOD_PR03). L1A unpacks and reformats the Level 0 data into scans of MODIS instrument data and writes the MOD01 product. MOD_PR03 (Geolocation) earth-locates the 1 km observations and writes the MOD03 product. MOD_PR03 also updates the metadata for MOD01. Figure 4-1 shows the structure of PGE01.

MODAPS PRODUCTION

Although PGE01 Production is primarily intended for the GES DAAC, it may also be run in MODAPS in an emergency backup scenario, for reprocessing, or for testing purposes. PGE01 is run by the MODAPS Recipe AM1M_0 upon the receipt of the 2-hour Terra MODIS L0 (MOD000) granules, the spacecraft ephemeris (AM1EPHNF) and spacecraft attitude (AM1ATTN0) for this time period from the GES DAAC. The corresponding Aqua granules are the 2-hour MODIS L0 (MODPML0), the daily spacecraft ephemeris (PM1EPHND), and the 2-hour spacecraft (PM1ATTNR). The current utcpole.dat and leapsec.dat files must also be installed at MODAPS. Each execution of PGE01 generates a set of 5-minute granules of MOD01 and MOD03. A total of 24 granules of each ESDT are produced for the 2-hour MOD000 granule. If these products are produced at MODAPS, they would be archived at MODAPS and then exported to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

PGE01 is data driven. It is executed when new Level 0 data are available from EDOS approximately every two hours. However, the GES DAAC will run the PGE in 15-minute segments. MOD000 is a required input. There are no other data product dependencies for MOD_PR01. Note that both the current and previous Level 0 files are preferred for PGE01 because up to 70 seconds of the engineering packets data for the current processing period may be available only in the previous Level 0 file. Thus a negative

delta time should be applied to the current processing start time to acquire the previous granule for a run of PGE01. In addition EDOS separates the data packets exactly at the end of the two hours. This sometimes causes packets that belong to the same MODIS scan at the beginning of the 2 hours to be put into the previous 2-hour granule. Thus the scheduler for PGE01 offsets the start of the data processing of the current 2-hour MOD000 granule to the last 5 minutes in the previous MOD000 granule. The scheduler for PGE01 ends the data processing of the current 2-hour MOD000 granule 5 minutes before the end of the file. The last 5-minute set of output granules will thus have a time stamp of 5 minutes before the end of the second hour in the current MOD000 file.

A time-out for the availability of the previous granule is set so that the data for the current period can be processed without the previous granule if necessary. Because the PGE may be run without the previous granule of MOD000, the previous granule is registered as an Optional Input at SSI&T and is read under a different logical unit number in the PCF. Due to the large size of the MOD000 granules, EDOS must break the granule into several files. MOD000 has multi-file granules.

MOD_PR03 also requires the spacecraft attitude and ephemeris files, the Planetary Ephemeris file from the Jet Propulsion Laboratory, the current leapsec.dat file, the current utcpole.dat file, and the digital elevation model files. MOD_PR01 also uses the current leapsec.dat file. All of these ancillary files are read through calls to the SDP Toolkit. The preferred ephemeris input for Terra is AM1EPHNF (Native Format, Flight Dynamics Division (FDD)); but if it is not available, PGE01 may use the AM1EPHN0 (Native Format, Level 0 Processing Facility)). The preferred attitude input for Terra is AM1ATTN0 (Native Format, Level 0 Processing Facility); but if it is not available, PGE01 may use the AM1ATTNF (Native Format, FDD). For Aqua processing, the PM1EPHND (Native Format, Definitive) and PM1ATTNR (Native Format, Refined) are highly preferred as input products. There are other predicted Aqua alternatives that could be used if absolutely necessary, but these have never actually been used.

The Production Rules for PGE01 are the following:

- Basic Temporal,
- Advanced Temporal,
- Optional Inputs.

The geolocation process (MOD_PR03) also has the capability of reading spacecraft attitude and ephemeris data from ancillary packets in the Terra L1A (MOD01) product that have been copied from the Terra L0 input to MOD_PR01. However, these data are not valid during the spacecraft maneuvers. The corresponding fields in the Aqua L0 input to MOD_PR01 are zero-filled and are thus copied to the Aqua L1A as zero-filled fields. To use this alternative capability for Terra processing, PGE01 can be configured in another profile that would not require the external attitude file. The PGE01 profile would still require the ephemeris files. This alternate capability is not currently being activated in production.

* Level 1A Earth Location ATBD Version 3.0, p 3-39; SDST-092, August 26, 1997.

Data Files**Static Input ESDT**

MOD01LUT	MODIS/Terra Engineering List of Data Structures for production of MOD01
MOD03LUT	MODIS/Terra Input Instrument and Satellite Parameters for Production of MOD03 Product

Dynamic Product Input ESDT

MOD000	MODIS/Terra Raw Instrument Packets 2-Hr L0 Swath (R) 1, (O) 1
MODPML0	MODIS/Aqua Raw Instrument Packets 2-Hr L0 Swath (R) 1, (O) 1

Static Ancillary Input

Digital Elevation	Model Digital elevation data sets in Geographic Projection at 30 arc second resolution in HDF-EOS GRID format to be read via the SDP Toolkit
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Dynamic Ancillary Product Input

AM1ATTN0	Terra 2-hour spacecraft ephemeris/orbit data files to be read via SDP Toolkit; Native Format, Level 0. (Preferred input) (R) 1, (O) 1
AM1ATTNF	Terra 2-hour spacecraft ephemeris/orbit data files to be read via SDP Toolkit; Native Format, FDD. (Alternate input) (R) 1, (O) 1
AM1EPHNF	Terra 2-hour spacecraft ephemeris/orbit data files to be read via SDP Toolkit; Native Format, FDD. (Preferred input) (R) 1, (O) 1
AM1EPHN0	Terra 2-hour spacecraft ephemeris/orbit data files to be read via SDP Toolkit; Native Format, Level 0. (Alternate input) (R) 1, (O) 1
PM1EPHND	Aqua daily spacecraft ephemeris/orbit data files to be read via SDP Toolkit; Native Format, Definitive. (R) 1, (O) 1
PM1ATTNR	Terra 2-hour spacecraft attitude data files to be read via SDP Toolkit; Native Format, Refined. (R) 1, (O) 1
leapsec.dat	Data file used by the SDP Toolkit that relates leap second (TAI-UTC) values to UTC Julian dates (R) 1

utcpole.dat	Data file used by the SDP Toolkit that relates UT1-UTC values to UTC dates (R) 1
-------------	--

Dynamic Product Output ESDT

MOD01	MODIS/Terra Raw Radiances in Counts 5-Min L1A Swath (A _D) 1*
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (A _D) 1*

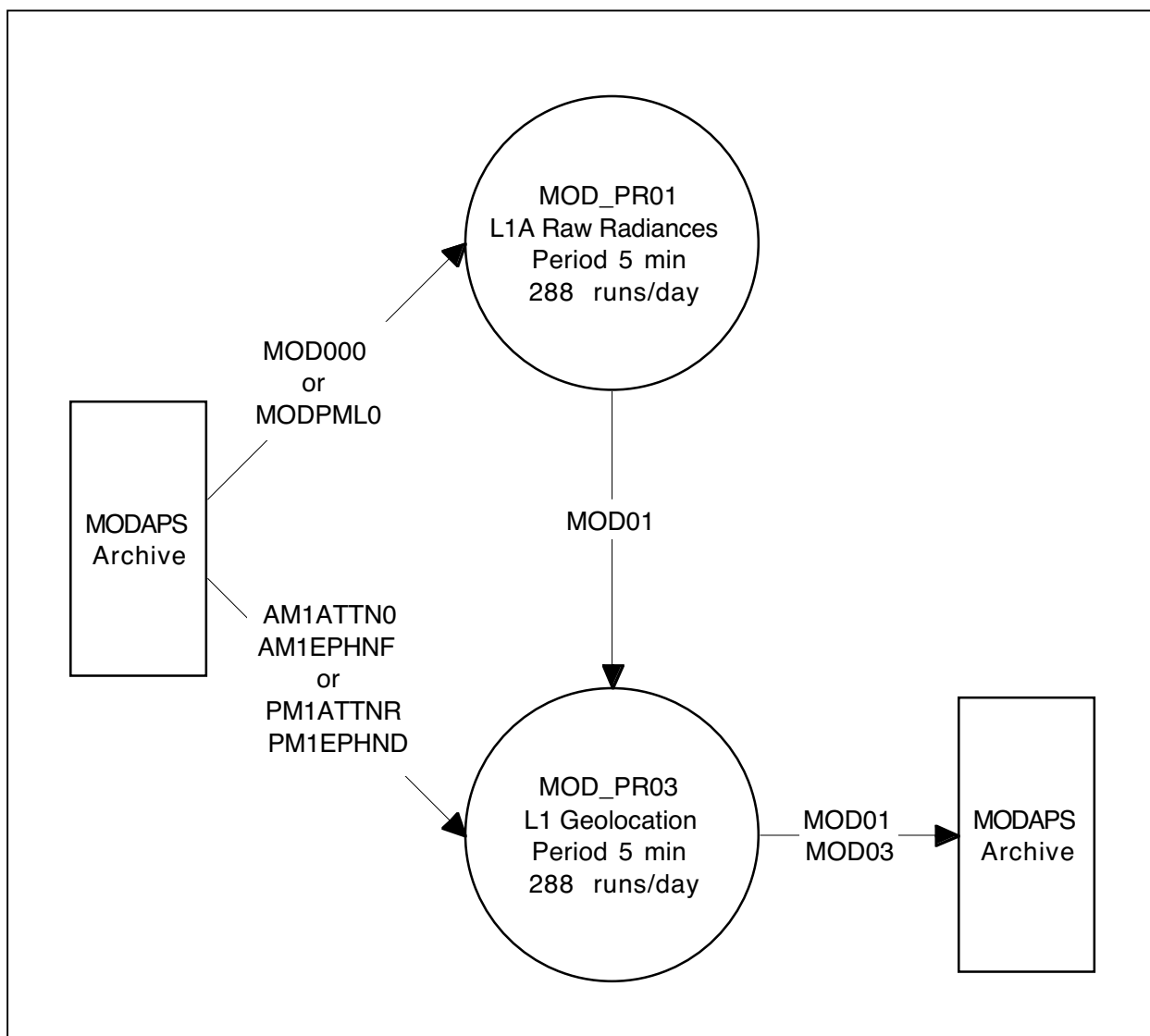
Dynamic Runtime Parameters for Operations

Collection Start Time	<Start time for data observations>
Collection Stop Time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by the data processing system. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; to be supplied by the data processing system.>

* Minimum number of granules per PGE01 execution to be considered successful.

Static Runtime Parameters for Operations

Length of L1A granules in seconds	<Granule size is read from MODAPS DatabaseTable: MEBS_PARAMETERS; currently set for SDPS to 300 seconds>
Scan rate for L1A granule	1.47718144
Source for spacecraft kinematic state	"SDP Toolkit"
Terrain Correction Flag	"TRUE"
ReprocessingActual	"reprocessed"
ReprocessingPlanned	"further update is anticipated"
PGE01 Version	<Version of PGE01 that appears in the ciList delivered with the code>
L1A Version	<Version of MOD_PR01 that is updated when new versions of code are delivered. Example: First value for MODIS Version 4 processing = 4.0.0>
MOD_PR01 LUT RCS Revision	<RCS Revision number for the expected MOD_PR01 LUT file.>
MOD_PR03 LUT RCS Revision	<RCS Revision number for the expected MOD_PR03 LUT file.>
LOCAL VERSIONID	<Version identification for MOD03 filespec. Example: First value for MODIS Version 4 processing = 4.0.0>

**Figure 4-1 PGE01 Structure**

4.2 Level 1B Calibration (PGE02)

PGE02 performs the MODIS Level 1B (L1B) processing, which runs on a per-granule basis after PGE01 processing is executed at GSFC.

Purpose

PGE02 converts the raw (L1A) detector counts into fully calibrated top-of-atmosphere radiances.

Structure

PGE02 consists of two processing steps. L1B (MOD_PR02) converts the raw counts into radiances and writes the data products at 1 km resolution (MOD021KM), 500 m resolution (MOD02HKM), and 250 m resolution (MOD02QKM). MOD_PR02 also produces the on-board calibration engineering data (MOD02OBC). MOD_PR02QA produces the QA files for the radiance files (MOD021QA).

MODAPS Production

Although PGE02 production is primarily intended for the GES DAAC, it may also be run in MODAPS in an emergency backup scenario, for reprocessing, or for testing purposes. PGE02 is part of the MODAPS Recipe AM1M_1, which is run every 2 hours upon the availability of L1A Raw Radiances and Geolocation granules for this time period. Each execution of PGE02 generates a 5-minute granule of each product ESDT. A total of 24 granules of each ESDT are produced in the 2-hour processing period with the following exception. Because of the large volume of data produced by PGE02, the MOD02HKM and MOD02QKM products are no longer generated for the night mode data. The products that are produced and archived at the GES DAAC and at MODAPS, when PGE02 runs there, are MOD021KM, MOD02HKM, MOD02QKM, MOD02OBC, and MOD021QA. If produced at MODAPS, these products would be exported to the PDR Server for archive and distribution at the GES DAAC.

However, there is a difference in production at the GES DAAC and MODAPS when an ephemeris file is either missing or corrupted. If there is no ephemeris available, a flag value of -1 is set by PGE01 in the Orbit Number attribute for all MOD01 and MOD03 output granules. A granule with an invalid orbit number, such as -1, causes this granule to be rejected on the insert to the ECS Data Server at the GES DAAC and this granule will not be archived. Because PGE01 and PGE02 are run sequentially in the same local disk area at the GES DAAC, PGE02 has the input MOD01 and MOD03 data with invalid orbit numbers available and makes all of the MOD02 products for this time period. Only the MOD02OBC and MOD021QA are of value to the MODIS Calibration Science Team. MOD021QA does not have the Orbit Number and therefore is archived. The Mandatory field in the MOD02OBC has been modified to a value of "False" so that the insert and archive will proceed successfully. The other MOD02 science files are rejected and are thus never input to downstream PGEs. At MODAPS all of these product granules with invalid Orbit Number are archived, exported to the GES DAAC, and input to the downstream PGEs until a PGE in each stream fails.

Production Rules

PGE02 is executed once for each 5-minute granule of MOD01 produced by PGE01. The input to PGE02 consists of three granules of MOD01 data (previous, current, following) and one granule of MOD03 data (synchronized with the current MOD01 granule). Delta times of up to 5 minutes must be applied to the current processing start and end times of PGE02 to retrieve the previous and following granules of MOD01. The total, nominal number of executions is 288 per day.

Only MOD03 and the current granule of MOD01 are required for the mission version of PGE02. The previous and following granules of MOD01 are optional inputs. Products generated and archived at either the GES DAAC or MODAPS are MOD021KM, MOD02HKM, MOD02QKM, MOD02OBC, and MOD021QA. Because of the large volume of data from PGE02, only the day mode products for MOD02HKM and MOD02QKM are generated. If produced at MODAPS, all of these products would be exported to the GES DAAC for archive.

The Production Rules for the current version are the following:

- Basic Temporal,
- Advanced Temporal,
- Optional Inputs.

Data Files

Static Input ESDT

MOD02LUT	MODIS/Terra Instrument Calibration Parameters LUT for Production of MOD02 Products (MOD02LUT contains three files consisting of reflective LUTs, emissive LUTs, and QA LUTs.)
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Dynamic Product Input ESDT

MOD01	MODIS/Terra Raw Radiances in Counts 5-Min L1A Swath (R) 1 (O) 2
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1

Dynamic Product Output ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (A _D) 1
MOD02HKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 500m (A _D) 1
MOD02QKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 250m (A _D) 1
MOD02OBC	MODIS/Terra On-Board Calibrator and Engineering Data 5-Min L1B (A _D) 1

MOD021QA

MODIS/Terra QA Summary of Calibrated Radiances
5-Min L1B 1km (A_D) 1**Dynamic Runtime Parameters for Operations**

SatelliteInstrument <Spacecraft platform for MODIS Instrument
supplied by the data processing system. Value =
{AM1M, PM1M}>

ProcessingEnvironment <Computer platform on which PGE is run; usually
supplied by the data processing system, but in this
case it is determined by MOD_PR02.>

Write_Night_Mode_HiRes_Data <Logical flag; 1=produce 250m & 500m data
sets for all granules, 0=produce 250m & 500m
data sets only for granules having day mode
scans>

PROCESSINGCENTER <Set by facility processing the data.>

Static Runtime Parameters for Operations

MCSTLUT Version <Version of PGE02 combined with LUT update
number, e.g., "3.2.5.2_Terra">

REPROCESSINGACTUAL <Set by Science Team; default = "reprocessed">

REPROCESSINGPLANNED <Set by Science Team; default = "further update is
anticipated">

4.3 Level 2 Cloud Mask/Atmospheric Profiles (PGE03)

PGE03 is the first step in the L2 processing of the MODIS data. It consists of some atmospheric processes, which produce products needed by other MODIS L2 processes, and is executed at the GES DAAC.

Purpose

PGE03 produces atmospheric products needed by other MODIS processes. These products are Cloud Mask and Spectral Test Results (MOD35_L2) and Profiles of Temperature and Water Vapor (MOD07_L2). It also generates the Volcano Alert message file (MODVOLC) that should be distributed to the originating SCF for analysis.

Structure

PGE03 consists of three processes: Cloud Mask (MOD_PR35), Temperature and Water Vapor Profiles (MOD_PR07), and Volcano Alert (MOD_PRVOLC). Figure 4-2 shows the structure of PGE03.

MODAPS Production

Although PGE03 production is run at the GES DAAC, it may also run in MODAPS in an emergency backup scenario, for reprocessing, or for testing purposes. PGE03 is part of MODAPS Recipe AM1M_1c, which is run every 2 hours upon the availability of L1B Calibrated Radiances (MOD021KM) and Geolocation (MOD03) granules for this time period and GDAS_0ZF, NISE, and SEA_ICE ancillary data close to the temporal period for the output granules from PGE03. Each execution of PGE03 in AM1M_1c generates a 5-minute granule of each product ESDT. A total of 24 granules of each ESDT are produced in the 2-hour processing period. If PGE03 is run at the GES DAAC, the output MOD35_L2, and MOD07_L2, MODVOLC are archived at the GES DAAC. If PGE03 is run at MODAPS, these products are archived at MODAPS and exported to the PDR Server for archive at the GES DAAC.

Production Rules

PGE03 runs once for each five minute MODIS calibrated radiance granule. The operational scenario is nominally 288 activations per day, representing the processing of one granule per PGE execution.

The required inputs are one granule each of MOD03 and MOD021KM. MOD02QKM is an optional input and only daytime granules are staged. MOD_PR35 and MOD_PR07 also read ancillary files (GDAS_0ZF, NISE, and SEA_ICE) that should be available before processing begins. The ancillary data are required but the production rules defined below allow selections of NISE and SEA_ICE from other time periods in an order of preference.

Using the Advanced Temporal Production Rule as described in Section 5.8, PGE03 would specify delta times to the start and end of the data processing period to retrieve the data that best matches the granule time of the MOD02 calibrated radiances and MOD03 Geolocation. The implementation of the rule is done differently at the DAAC

and MODAPS, but it results in staging the same granule. Instead of specifying wait times for the selected granule to be available or time-outs for selecting the next option, the granules of a given ESDT type within a specified time window are given an order of preference for staging for a PGE run. Based on knowledge of arrival times of the different types of ancillary data, the data processing center plans and schedules PGEs at optimum times. If none of the granules within the window are available, the data processing center handles the problem and confers with the Science Discipline Group to arrive at decision on running the PGE accordingly.

The following definitions are defined for the granule selection. The terms Next and Prior refer to days in advance and behind the Current MODIS day, respectively.

Current: Granule that overlaps the midpoint of MODIS Collection period.

Prior 1: Granule immediately prior to "Current" granule.

Prior 2: Granule immediately prior to "Prior 1" granule.

Prior "x+1" : Granule immediately prior to "Prior x" granule.

Next 1: Granule immediately after "Current" granule.

Next 2: Granule immediately after "Next 1" granule.

Next "x+1" : Granule immediately after "Next x" granule.

In MODAPS or the GES DAAC the ancillary data would be selected and staged using extensions to the Advanced Temporal Production Rule under the following specifications:

GDAS_0ZF contains ECS SingleDateTime metadata. The data processing system selects the Current ancillary granule whose SingleDateTime is nearest the midpoint of the MODIS output granule collection period. The data processing system selects the ancillary granule in the following order of preference:

Order of Preference	Product File
-----	-----
1	Current

SEA_ICE contains ECS SingleDateTime metadata. The data processing system selects the ancillary granule in the following order of preference:

Order of Preference	Product File
-----	-----
1	Current
2	Prior 1
3	Prior 2
4	Prior 3
5	Prior 4

6	Prior 5
7	Prior 6
8	Prior 7

NISE contains ECS RangeDateTime metadata. A query for NISE products is made with start times in an 8-day window centered a day ahead of the MODIS data-day. The bias toward Next products in the Preference scale addresses the fact that a typical NISE product is derived primarily from the previous day's observations. The data processing system selects the ancillary granule in the following order of preference:

Order of Preference	Product File
-----	-----
1	Next 1
2	Current
3	Next 2
4	Prior 1
5	Next 3
6	Prior 2
7	Next 4
8	Prior 3

Static inputs include the Olson World EcoSystem Maps at both 1km and 10 minute climatology data sets and a MOD_PR35 thresholds parameter file. Separate regression coefficient and MODIS sensor zenith angle parameter files are used by MOD_PR07.

The Volcano Alert message file is an interim product that may be deleted after it is distributed to the SCF for analysis. The short and long durations for keeping the interim MODVOLC is required for use in the PDPS. The MOD35_QC and MOD07_QC are also interim products. Specification of short and long durations for these ESDTs is required at registration of the PGE.

The Production Rules for PGE03 are:

- Basic Temporal,
- Advanced Temporal,
- Optional Inputs.

Data Files

Static Input ESDT

MOD35ANC

MODIS/Terra Olson World Ecosystem Maps at 10 Minute and 1km Resolution and Cloud Mask Thresholds Parameter File (Shared Atmosphere ESDT)

MOD07LUT	MODIS/Terra Regression Coefficients and MODIS Sensor Zenith Angle Parameter Files (Plus Bias Corrections and Detector Flags Tables)
----------	---

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD02QKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 250m (O) 0
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1

Dynamic Ancillary Product Input ESDT

GDAS_0ZF	NCEP GDAS Meteorological Data GRIB Format 6-Hr L3 Global 1Deg Lat/Lon (R) 1
SEA_ICE	NCEP SSM/I Sea Ice Concentration GRIB Format Daily L3 Global 0.5Deg Lat/Lon (R) 1
NISE	NSIDC SSM/I Near Real-Time Ice Concentration/Snow Extent Daily L3 25km EASE-Grid (R) 1

Dynamic Product Output ESDT

MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km (A _D) 1
MOD07_L2	MODIS/Terra Temperature and Water Vapor Profiles 5-Min L2 Swath 5km (A _D) 1
MODVOLC	MODIS/Terra Volcano Alert 5-Min L2 (I _D) 1
MODCSR_G	MODIS/Terra Clear Sky Radiances Statistics Index 25km Global Grid 5-Min L2 Swath (I _D) 1

Quality Control or Diagnostic Output ESDT

MOD35_QC	MODIS/Terra Cloud Mask and Spectral Test Diagnostics 5-Min L2 250m and 1km (I _D) 1
MOD07_QC	MODIS/Terra Temperature and Water Vapor Profiles 5-Min L2 Swath 5km (I _D) 1

Temporary Output Files

Two sets of temporary files for each ancillary data set:

Reformatted GDAS_0ZF data used by MOD_PR35 and MOD_PR07

Reformatted SEA_ICE data used by MOD_PR35 and MOD_PR07

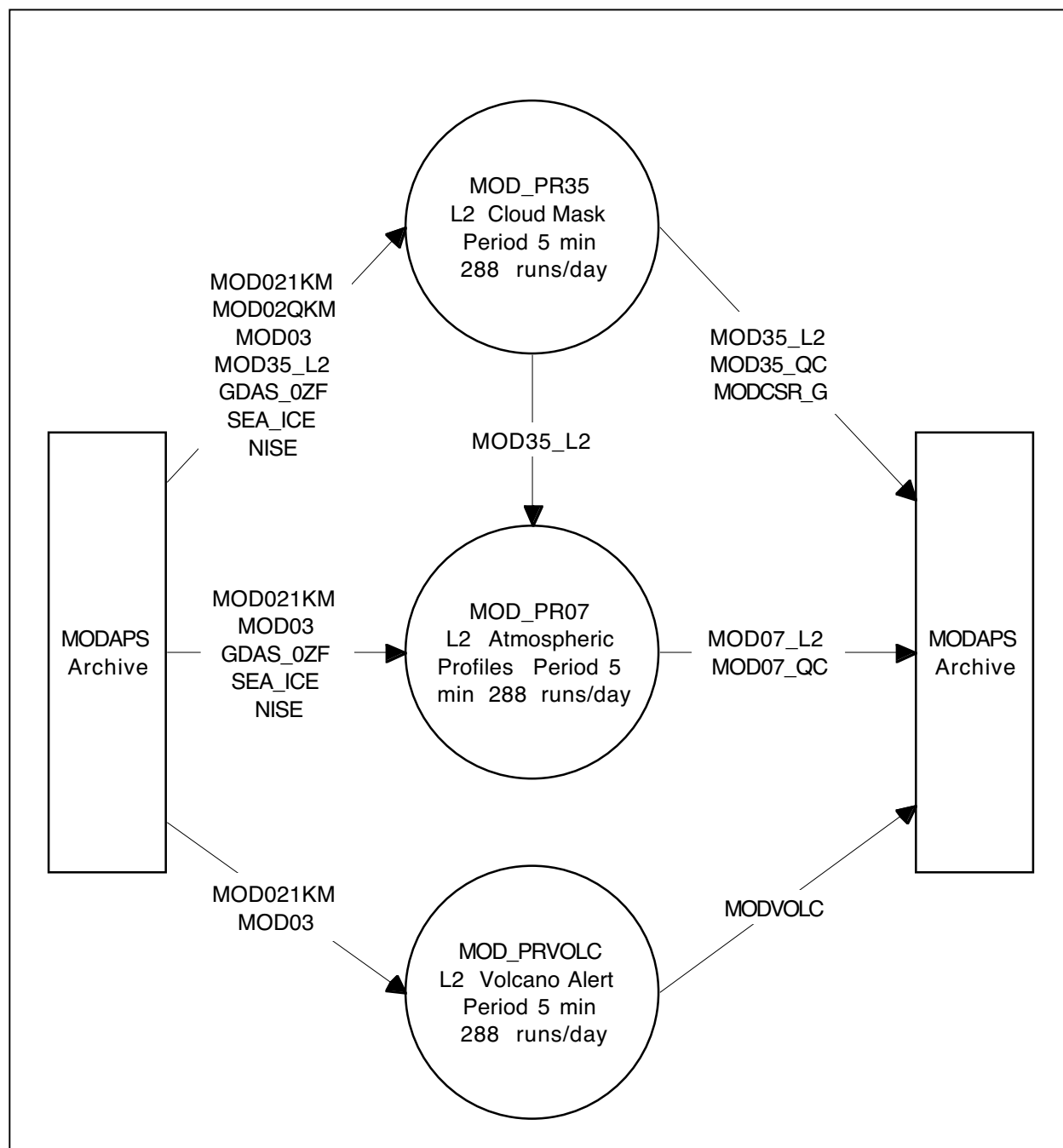
Dynamic Runtime Parameters for Operations

Collection Start Time	<Start time for data observations>
Collection End Time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by the data processing system. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; to be supplied by the data processing system.>

Static Runtime Parameters for Operations

For MOD35_L2:	
REPROCESSINGACTUAL	"reprocessed"
REPROCESSINGPLANNED	"further update is anticipated"
LOCALVERSIONID	<Value of Collection Versions; Current value = 004.>
PGEVERSION	<Version of PGE03 that appears in the ciList delivered with the Code>
ALGORITHMPACKAGEACCEPTANCEDATE	<Date on which the Science Discipline Group accepted the algorithm used in the processing code to make the product>
ALGORITHMPACKAGEMATURITYCODE	<Classification of maturity of the algorithm code as determined by the Science Discipline Group>
ALGORITHMPACKAGENAME	<Name of the algorithm used in the processing code; current value = ATBD-MOD-07.>
ALGORITHMPACKAGEVERSION	<Version of the algorithm used in the processing code>
INSTRUMENTNAME	Moderate Resolution Imaging Spectroradiometer
Profiles_Algorithm_Version_Number	1
Total_Ozone_Algorithm_Version_Number	1
Stability_Indices_Algorithm_Version_Number	1
For MOD07_L2:	
REPROCESSINGACTUAL	"reprocessed"
REPROCESSINGPLANNED	"further update is anticipated"
LOCALVERSIONID	<Value of Collection Versions. Current value = 004.>
PGEVERSION	<Version of PGE03 that appears in the ciList delivered with the code>
ALGORITHMMPASKAGEACCEPTANCE DATE	<Date on which the Science Discipline Group accepted the algorithm used in the processing code to make the product>
ALGORITHMPACKAGEMATURITYCODE	<Classification of maturity of the algorithm code as determined by the Science Discipline Group>
ALGORITHMPACKAGENAME	<Name of the algorithm used in the processing code; current value = ATBD-MOD-06.>
ALGORITHMPACKAGEVERSION	<Version of the algorithm used in the processing code>
INSTRUMENTNAME	Moderate Resolution Imaging Spectroradiometer
UW DEBUG; 0 to 4, no output to reams	0
Processing Range Begin Line	0

Processing Range Number of Lines	0
Processing Range Begin Element	0
Processing Range Number of Elements	0

**Figure 4-2 PGE03 Structure**

4.4 Level 2 Atmosphere (PGE04)

PGE04 represents the second step in the atmosphere L2 processing executed at MODAPS.

Purpose

PGE04 produces the day-only atmosphere Aerosol product (MOD04_L2) and the Total Precipitable Water Vapor (MOD05_L2) which is produced both during the day and at night.

Structure

PGE04 is comprised of a single L2 atmosphere processing step (MOD_PR04_05).

MODAPS Production

PGE04 is run in MODAPS Recipe AM1M_A1, which is executed for every 5-minute data period upon the availability of MOD021KM, MOD02HKM, MOD02QKM, MOD03, MOD35_L2, MOD07_L2, GDAS_0ZF, and OZ_DAILY granules covering the processing period. A 28-day search interval centered on the collection period is specified for the OZ_DAILY product. The ancillary granule with center point in the search interval and nearest to the MODIS collection period midpoint is chosen. Products archived at MODAPS are 5-minute granules of MOD04_L2 and MOD05_L2 covering the processing period. MODAPS exports MOD04_L2 and MOD05_L2 to the PDR Server for archive and distribution at the GES DAAC. MODAPS Interim products for the same period are granules of MOD04_QC, MOD05_QC, and MOD5C_QC.

Production Rules

PGE04 runs once for each five minute MODIS L1B granule. The top level Production Rule is Basic Temporal. The operational scenario is nominally 288 activations per day.

The required inputs for PGE04 are MOD03 from PGE01; MOD021KM, MOD02HKM, and MOD02QKM from PGE02; MOD07_L2 and MOD35_L2 from PGE03. The MOD02HKM and MOD02QKM are only generated for daytime data. The required inputs also include ancillary data sets: GDAS_0ZF and OZ_DAILY. The climatology data for PGE04 include the static input files in the LUTs described below.

Using the MODAPS extension of the Advanced Temporal Production Rule, the Production System retrieves the ancillary files that best match the processing period. The GDAS_0ZF and OZ_DAILY products contain ECS SingleDateTime metadata. MODAPS selects the ancillary data granule whose SingleDateTime is within the search interval and nearest the MODIS collection period midpoint.

If the scene data contains day mode data, defined by $\text{MinSolarZenithAngles} < 72^\circ$ as read from the PSA in the upstream MOD35_L2 product, PGE04 performs the retrieval of aerosol and near-infrared total precipitable water vapor and outputs both science products (MOD04_L2 and MOD05_L2). If the input data contain night mode data, defined by $\text{MinSolarZenithAngle} \geq 72^\circ$, PGE04 performs only the copying of total

precipitable water derived from infrared channels from MOD07_L2 into the science product (MOD05_L2). MOD04_L2 is not produced at night. All of the QC products (MOD04_QC, MOD05_QC, and MOD5C_QC) are interim products.

The Production Rules for PGE04 are:

- Basic Temporal,
- Advanced Temporal,
- Nearest Temporal Match.

Data Files

Static Input ESDT

MOD04LUT	MODIS/Terra Radiative Transfer LUTs for Production of MOD04_L2 Products
MOD5CLUR	MODIS/Terra Atmospheric Correction Reflectance and Channel Ratio LUT for Production of MOD05_L2 Products
MOD05LUR	MODIS/Terra Radiative Transfer LUTs for Production of MOD05_L2 Products
MOD05LUW	MODIS/Terra Weight Factors LUT for Production of MOD05_L2 Products

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD02HKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 500m (R) 1
MOD02QKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 250m (R) 1
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km (R) 1
MOD07_L2	MODIS/Terra Temperature and Water Vapor Profiles 5-Min L2 Swath 5km (R) 1

Dynamic Ancillary Product Input ESDT

GDAS_0ZF	NCEP GDAS Meteorological Data GRIB Format 6-Hr L3 Global 1Deg Lat/Lon (R) 1
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OZ_DAILY	NCEP TOVS Column Ozone GRIB Format Daily L3 Global 1Deg Lat/Lon (R) 1
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Dynamic Product Output ESDT

MOD04_L2	MODIS/Terra Aerosol 5-Min L2 Swath 10km (A _M) (A _D) 1
MOD05_L2	MODIS/Terra Total Precipitable Water Vapor 5-Min L2 Swath 1km and 5km (A _M) (A _D) 1

Quality Control or Diagnostic Output ESDT

MOD04_QC	MODIS/Terra MOD_PR04 Diagnostic File for Uncorrected Water Vapor 5-Min L2 (I _M) 1
MOD05_QC	MODIS/Terra MOD_PR05 Diagnostic File for Uncorrected Water Vapor 5-Min L2 (I _M) 1
MOD5C_QC	MODIS/Terra MOD_PR05 Final Diagnostic File for Corrected Water Vapor 5-Min L2 (Future) (I _M) 1

Temporary Output Files

Two sets of temporary files for each ancillary data sets:

Reformatted GDAS_0ZF data used by MOD_PR04_05

Reformatted OZ_DAILY data used by MOD_PR04_05

Dynamic Runtime Parameters for Operations

Collection Start Time	<Start time for data observations>
Collection End Time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

For MOD04 products:

REPROCESSINGACTUAL	"reprocessed"
REPROCESSINGPLANNED	"further update is anticipated"
LOCALVERSIONID	<Value of Collection Version; current value = 004>
PGEVERSION	<Version of PGE04 that appears in the ciList delivered with the code>
ALGORITHMPACKAGEACCEPTANCEDATE	<Date on which the Science Discipline Group accepted the algorithm used in the processing code to make the product>
ALGORITHMPACKAGEMATURITYCODE	<Classification of maturity of the algorithm code as determined by the Science Discipline Group>
ALGORITHMPACKAGENAME	<Name of the algorithm used in the processing code; current value = ATBD-MOD-02>

ALGORITHMPACKAGEVERSION	<Version of the algorithm used in the processing code>
INSTRUMENTNAME Moderate	Resolution Imaging Spectroradiometer
ALGORITHMSOFTWAREVERSIONLand	<Version of the algorithm used in the processing Land code>
ALGORITHMSOFTWAREVERSIONOcean	<Version of the algorithm used in the processing Ocean code>
For MOD05 products:	
REPROCESSINGACTUAL	"reprocessed"
REPROCESSIONGPLANNED	"further update is anticipated"
LOCALVERSIONID	<Value of Collection Version; current value = 004>
PGEVERSION	<Version of PGE04 that appears in the ciList delivered with the code>
ALGORITHMPACKAGEACCEPTANCEDATE	<Date on which the Science Discipline Group accepted the algorithm used in the processing code to make the product>
ALGORITHMPACKAGEMATURITYCODE	<Classification of maturity of the algorithm code as determined by the Science Discipline Group>
ALGORITHMPACKAGENAME	<Name of the algorithm used in the processing code; current value = ATBD-MOD-03>
ALGORITHMPACKAGEVERSION	<Version of the algorithm used in the processing code>
INSTRUMENTNAME	Moderate Resolution Imaging Spectroradiometer
ALGORITHMSOFTWAREVERSION_NIR	<Version of the Near Infrared algorithm used in the processing code>
ALGORITHMSOFTWAREVERSION_IR	<Version of the Infrared algorithm used in the processing code>

4.5 Level 3 Orbital Land Aerosol (PGE05)

PGE05 performs the L3 Land Aerosol processing at MODAPS. The product from PGE05 is no longer used by MODIS PGEs. PGE05 is being retained until the Land Discipline makes a final decision.

Purpose

PGE05 produces the L3 Land Orbital Aerosol Product (MOD04L_O). PGE05 was developed to provide this product for input to the Land Surface Reflectance processing.

Structure

PGE05 consists of the L3 Land Aerosol process (MOD_PR04ORB).

MODAPS Production

PGE05 is no longer run in MODAPS Operations, but it is being maintained for possible use in the future. PGE05 is run in MODAPS Recipe AM1M_L3, which is executed every orbit upon the availability of MOD04_L2. MODAPS stages all input granules whose temporal coverage overlaps the orbit span. Terra orbits start and stop on the ascending node Equator crossing. Products archived at MODAPS are orbital granules of MOD04L_O covering the orbital processing period. In the future MODAPS may export MOD04L_O to the PDR Server for Archive and distribution at the GSFC DAAC.

Production Rules

PGE05 runs when a full orbit of L2 Aerosol (PGE04) processing has completed. The operations scenario is one activation per orbit for approximately 15 orbits per day. The required input products are granules of MOD04_L2. The Minimum Number of Granules for the required input is set to one granule. After a wait period of 24 hours for all granules in the orbit to be available, PGE05 is executed if there is at least one granule of MOD04_L2.

The Production Rules for PGE05 are:

- Orbit-Based Activation,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD04_L2	MODIS/Terra Aerosol 5-Min L2 Swath 10km (R)	1
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Dynamic Product Output ESDT

MOD04L_O	MODIS/Terra Orbital Aerosol Product 1-Orbit L3 Swath 18km SIN Grid (A _M) (A _D)*	1
----------	---	---

* Data may be archived at the GES DAAC in the future.

Dynamic Runtime Parameter for Operations

Collection Start Time	<Start time for data observations>
Collection End Time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL	"reprocessed"
REPROCESSINGPLANNED	"further update is anticipated"
LOCALVERSIONID	<Value of Collection Version; current value = 004>
PGEVERSION	<Version of PGE05 that appears in the ciList delivered with the code>
DAYNIGHTFLAG	Day

4.6 Level 2 Clouds (PGE06)

PGE06 performs the L2 Atmospheric Clouds processing at MODAPS.

Purpose

PGE06 produces the L2 Clouds product (MOD06_L2) and the QC files for Cloud Top Algorithm (MOD6CTQC), Cirrus Detection Algorithm (MOD6CDQC), and Cloud Optical Depth Algorithm (MOD6ODQC).

Structure

PGE06 consists of the L2 cloud processes, Create (MOD_PR06CR), Cloud Top (MOD_PR06CT), Cirrus Detection (MOD_PR06CD), and Cloud Optical Depth (MOD_PR06OD) algorithms. Figure 4-3 shows the structure of PGE06

MODIS Production

The MODAPS Recipe Plan containing PGE06 is submitted each day. There is no requirement that all of the input granules be available at the time of submittal. PGE06 is run in MODAPS Recipe AM1M_A1, which is executed for every 5-minute data period upon the availability of MOD021KM, MOD03, MOD35_L2, GDAS_0ZF, NISE, REYNSST, and SEA_ICE granules covering the processing period. Search intervals centered on the MODIS collection period are specified for the REYNSST and SEA_ICE products. The ancillary granule with center point in the search interval and nearest to the MODIS collection period midpoint is chosen. A search interval centered 24-hours ahead of the current MODIS granule is specified for the NISE product. Products archived at MODAPS are 5-minute granules of MOD06_L2 covering the processing period. MODAPS exports MOD06_L2 to the PDR Server for archive and distribution at the GES DAAC. MODAPS Interim products for the same period are granules of MOD6CTQC, MOD6CDQC, MOD6ODQC, and MOD6ANCT.

Production Rules

PGE06 runs once per five-minute MODIS L1B granule. The operational scenario is nominally 288 activations per day, representing the processing of one granule per PGE execution.

The L2 Clouds product (MOD06_L2) is created by four processes that execute within PGE06. MOD_PR06CR generates the MOD06_L2 product definition file that contains all prescribed data objects in the HDF product specification document, except for ECS metadata. None of the science data arrays, however, are populated at this time. This and insertion of ECS metadata into the file are left for execution of the PGE06 science processing algorithms (MOD_PR06CT, MOD_PR06OD and MOD_PR06CD)

Following successful execution of MOD_PR06CR, either MOD_PR06CT or MOD_PR06CD may run next, but not MOD_PR06OD. MOD_PR06OD relies on the cloud top height and temperature data written to the MOD06_L2 product file. The Cloud Top Properties retrieval in MOD_PR06CT is performed on both dark and illuminated scenes. It writes to the Cloud Top Property data arrays during the granule level

processing and just prior to termination, transforms the MOD06_L2 product into an archivable file by setting and writing ECS metadata.

Processing in MOD_PR06CD begins with an examination of ECS attribute DayNightFlag taken from input ESDT MOD03. If the scene is totally dark (i.e., if DayNightFlag = 'Night'), the process exits immediately, writing a termination message to the ECS LogStatus file, but making no contribution to the output MOD06_L2 file nor generating a "QC" diagnostic output file. For an illuminated or partially illuminated scene (viz., for DayNightFlag = 'Day' or 'Both'), MOD_PR06CD opens the MOD06_L2 template file created by MOD_PR06CR, generates a QC file, and performs data processing on the granule. It writes to the cirrus detection arrays in the MOD06_L2 product, and also writes or updates the ECS metadata (depending on processing order within PGE06).

MOD_PR06OD begins execution by examining the value of the granule level ECS Metadata attribute MinSolarZenithAngle (taken from ESDT MOD35_L2). If the scene is dark (i.e. MinSolarZenithAngle less than 87 degrees), the process exits immediately, writing a termination message to the ECS LogStatus files, but making no contribution to the MOD06_L2 output file. For an illuminated or partially illuminated scene, MOD_PR06OD opens the MOD06_L2 file created by MOD_PR06CR, and does science data processing on the granule. It writes to the MOD06_L2 parameter arrays specifically reserved for output from cloud optical depth code, and completely rewrites the ECS metadata recorded by predecessor processes within PGE06.

The required MODIS inputs are MOD021KM, MOD03, and MOD35_L2. The required external ancillary data sets are GDAS_0ZF, SEA_ICE, REYNSST, and NISE. The required look-up tables and climatological data for PGE06 are contained in the static input files described below.

Using the MODAPS extension of the Advanced Temporal Production Rule, the Production System retrieves the ancillary files that best match the processing period.

The GDAS_0ZF product contains ECS SingleDateTime metadata. MODAPS selects the ancillary data granule whose SingleDateTime is nearest the MODIS granule midpoint.

The SEA_ICE product contains ECS SingleDateTime metadata. MODAPS selects the ancillary data granule whose SingleDateTime is within the search interval of 28 days and nearest the MODIS granule midpoint.

The REYNSST product contains ECS RangeDateTime metadata. MODAPS selects the ancillary granule whose midpoint (a Wednesday at 12Z GMT) is within the search interval of 28 days and nearest the MODIS granule midpoint.

The NISE product contains ECS RangeDateTime metadata. MODAPS searches a 5-day window centered on a time 24 hours ahead of the MODIS granule midpoint. MODAPS then selects the ancillary granule whose RangeDateTime midpoint is within the search interval and nearest to the search interval's midpoint. The 24-hour forward shift in the search window addresses the fact that a typical NISE product is derived primarily from the previous day's observations.

All of the QC products (MOD6CTQC, MOD6CDQC, MOD6ODQC, MOD6ODQC, and MOD6ANCT) are Interim products.

The Production Rules for PGE06 are:

- Basic Temporal,
- Advanced Temporal,
- Nearest Temporal Match,
- Optional Inputs.

Data Files

Static Input ESDT

MOD04LUT	MODIS/Terra Radiative Transfer LUTs for Production of MOD04_L2 Products
MOD06LUT	MODIS/Terra Cloud Product LUTs for Production of MOD_PR06CT and MOD_PR06OD
MOD35ANC	MODIS/Terra Olson World Ecosystem Maps at 10 Minute and 1km Resolution and Cloud Mask Thresholds Parameter File (Shared Atmosphere ESDT)

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD03	MODIS/Terra Geolocation Fields 5-Min L1B Swath 1km (R) 1
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km (R) 1
MODCSR_8	MODIS/Terra Clear Sky Radiance 8-Day Composite Daily L3 Global 25km Equal Area (Future) (O) 1

Dynamic Ancillary Product Input ESDT

GDAS_0ZF	NCEP GDAS Meteorological Data GRIB Format 6-Hr L3 Global 1Deg Lat/Lon (R) 1
NISE	NSIDC SSM/I Near Real-Time Ice Concentration/Snow Extent Daily L3 25km EASE-Grid (R) 1
REYNSST	NCEP AVHRR Reynolds Sea Surface Temperature Binary Weekly L3 Global 1Deg Lat/Lon (R) 1
SEA_ICE	NCEP SSM/I Sea Ice Concentration GRIB Format Daily L3 Global 0.5Deg Lat/Lon (R) 1

Dynamic Product Output ESDT

MOD06_L2	MODIS/Terra Clouds 5-Min L2 Swath 1km and 5km (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MOD6CTQC	MODIS/Terra MOD_PR06CT QC File for Cloud Top Algorithm 5-Min L2 (I _M) 1
MOD6CDQC	MODIS/Terra MOD_PR06CD QC File for Cirrus Detection Algorithm 5-Min L2 (I _M) 1
MOD6ODQC	MODIS/Terra MOD_PR06OD QC File for Cloud Optical Depth Algorithm 5-Min L2 (I _M) 1
MOD6ANCT	MODIS/Terra Level 2 Cloud Product Temporary File in HDF Format 5-Min L2 (I _M) 1

Temporary Output Files

Two sets of temporary files for each ancillary data sets:

Reformatted GDAS_0ZF for use by MOD_PR06CT and MOD_PR06OD

Reformatted from SEA_ICE for use by MOD_PR06CT and MOD_PR06OD

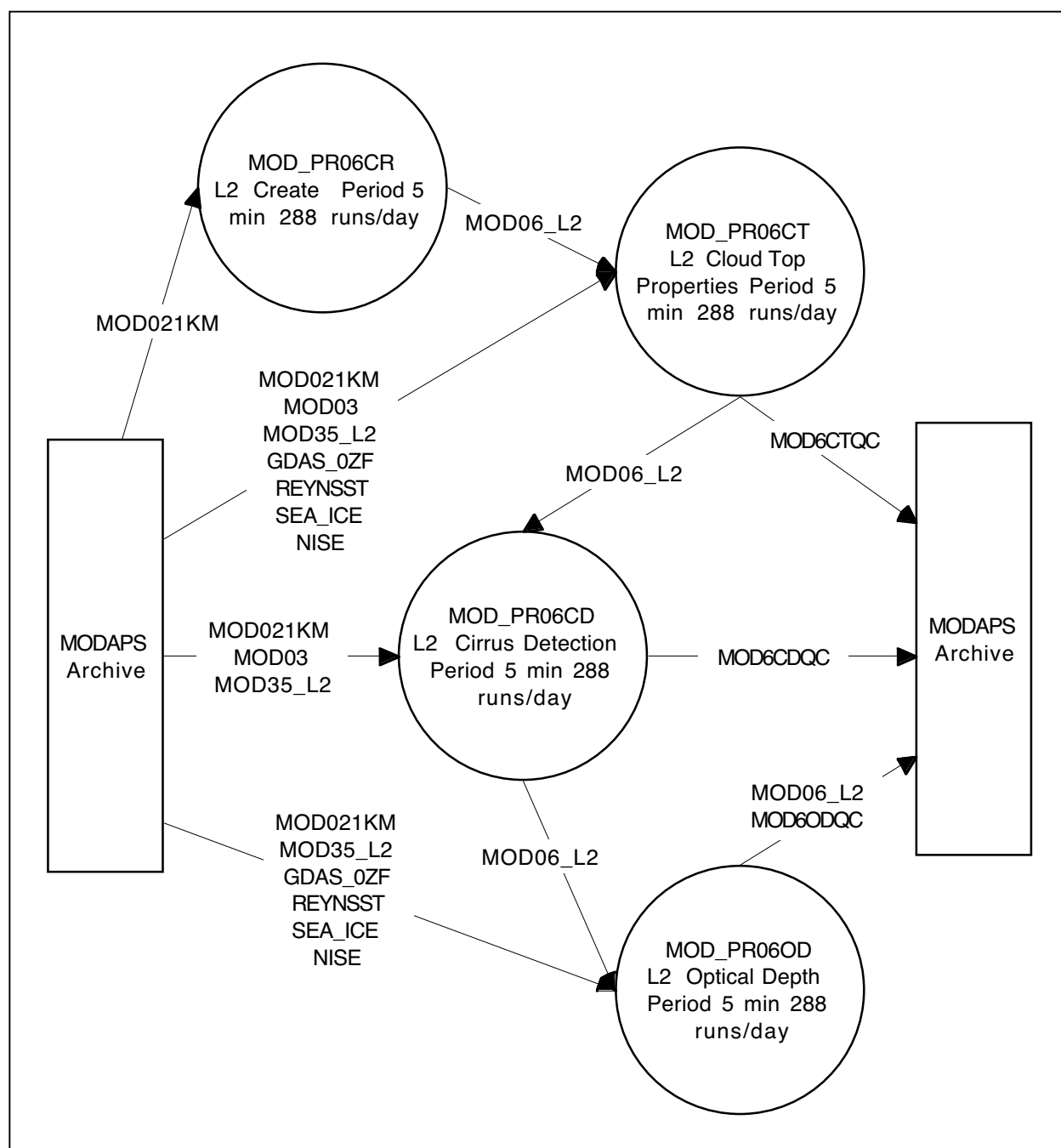
Dynamic Runtime Parameters for Operations

Collection Start Time	<Start time for data observations>
Collection End Time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL	"reprocessed"
REPROCESSINGPLANNED	"further update is anticipated"
LOCALVERSIONID	<Value of Collection Version; current value = 004>
PGEVERSION	<Version of PGE06 that appears in the ciList delivered with theCode>
ALGORITHMPACKAGEACCEPTANCEDATE	<Date on which the Science Discipline Group accepted the algorithm used in the processing code to make the product>
ALGORITHMPACKAGEMATURITYCODE	<Classification of maturity of the algorithm code as determined by the Science Discipline Group>
ALGORITHMPACKAGENAME	<Name of the algorithm used in the processing code; current values = ATBD-MOD-04 and ATBD-MOD-05>
ALGORITHMPACKAGEVERSION	<Version of the algorithm used in the processing code>

INSTRUMENTNAME		Moderate Resolution Imaging Spectroradiometer
Algorithm_Version_Cloud_Top_Property_IR		1
Algorithm_Version_Cloud_Phase_IR		1
Algorithm_Version_Cloud_Property_VIS		1
UW DEBUG; 0 to 4		0
Processing Range Begin Line		0
Processing Range Number of Lines		0
Processing Range Begin Element		0
Processing Range Number of Elements		0

**Figure 4-3 PGE06 Structure**

4.7 Level 2 Snow Cover (PGE07)

PGE07 is a part of the MODIS Land L2 processing. It produces the L2 Snow Cover product at MODAPS. The L2 Snow Cover data product is generated from MODIS L1B data at spatial resolution of one-half kilometer and one kilometer, data from the Geolocation product (MOD03), and data from the Cloud Mask product (MOD35_L2).

Purpose

PGE07 produces the L2 Snow Cover product (MOD10_L2), which is a day-only Land product, the L2 Snow Cover coarse resolution product (MOD10L2C), a BROWSE product, and the Land QA product (MODLM_QA).

Structure

PGE07 is comprised of two processing steps: L2 Snow Cover (MOD_PR10), the Land QA Process (MOD_PRLQA) which will execute immediately after MOD_PR10, and BROWSE (MOD_PRbrowse).

MODAPS Production

The MODAPS Recipe plan containing PGE07 is submitted each day. There is no requirement that all input granules be available at the time of submittal. PGE07 is run in MODAPS Recipe AM1M_L1, which is executed for every 5-minute data period upon the availability of day mode MOD02HKM, MOD021KM, MOD03, and MOD35_L2 granules covering the processing period. Products archived at MODAPS are 5-minute granules of MOD10_L2. There are nominally 12-day mode granules generated for each 2-hours of input Level 1 data ingested from the GES DAAC. MODAPS exports MOD10_L2 to the PDR Server for archive and distribution at the NSIDC DAAC. MODAPS Interim products for the same period are MOD10L2C and MODLM_QA, corresponding to the MOD10_L2 5-minute granules. PGE07 also produces a BROWSE product and exports it to the NSIDC DAAC.

Production Rules

PGE07 runs once for each five minute MODIS L1B granule containing day-mode data. The L1B granules will have the DayNightFlag set to "Day" or "Both". The required inputs are MOD03, MOD02HKM, MOD021KM, and MOD35_L2. The operational scenario is nominally 164 (about 144 for "Day" and 20 for "Both" settings) activations per day, representing the processing of one day-mode granule per PGE run. A query to the Database for granules with DayNightFlag set to "Day" or "Both" retrieves all MODIS granules containing day-mode data for the 164 daily processing runs.

The current plans of the MODIS Team include processing MODIS data located between 30 to 90 degrees North for the Northern Hemisphere and between 60 and 90 degrees South for the Southern Hemisphere for every day of the year. For certain geographical areas the processing is suspended for part of the year and for other geographical areas the processing boundaries are extended.

The Production Rules for PGE07 are:

- Basic Temporal,
- Metadata Based Query.

Data Files

Dynamic Product Input ESDT

MOD02HKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 500m (R) 1
MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km (R) 1

Dynamic Product Output ESDT

MOD10_L2	MODIS/Terra Snow Cover 5-Min L2 Swath 500m (A _M) (A _D) 1
MOD10L2C	MODIS/Terra Coarse Snow Cover 5-Min L2 Swath 5km (I _M) 1
BROWSE	MODIS/Terra Browse Products (A _M) (A _D) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

ALGORITHM_PACKAGE_ACCEPTANCE-DATE	<Date on which the Science Discipline Group accepted the algorithm used in the processing code to make the product >
ALGORITHM_PACKAGE_MATURITY_CODE	<Classification of maturity of the algorithm code as determined by the Science Discipline Group>
ALGORITHM_PACKAGE_NAME	<Name of the algorithm used in the processing code, e.g., product name specified in the Algorithm Theoretical Basis Document (ATBD)>

ALGORITHM_PACKAGE_VERSION

<Version of the algorithm used in the
processing code>

PGE07 Version

<Version of PGE07 that appears in the ciList
delivered with the code>

REPROCESSING_PLANNED

"further update is anticipated"

REPROCESSING_ACTUAL

"reprocessed"

4.8 Level 2 Sea Ice (PGE08)

PGE08 is the MODIS land L2 Sea Ice process executed at MODAPS. The Sea Ice Extent data product is generated from MODIS L1B data at spatial resolution of 1 km.

Purpose

PGE08 produces the L2 Sea Ice Extent product (MOD29), the L2 Sea Ice Extent coarse resolution product (MOD29L2C), a BROWSE product, and the Land QA product (MODLM_QA).

Structure

PGE08 consists of the sea ice processing (MOD_PR29), the Land QA process (MOD_PRLQA), and BROWSE (MOD_PRbrowse).

MODAPS Production

The MODAPS Recipe plan containing PGE10 is submitted each day. There is no requirement that all input granules be available at the time of submittal. PGE08 is run in MODAPS Recipe AM1M_L1, which is executed for every 5-minute data period upon the availability of MOD021KM, MOD03, and MOD35_L2 granules covering the processing period. Products archived at MODAPS are 5-minute granules of MOD29. There are nominally 24 granules generated for each 2-hours of input Level 1 data ingested from the GSFC DAAC. MODAPS exports MOD29 to the PDR Server for archive and distribution at the NSIDC DAAC. MODAPS Interim products for the same period are MOD29L2C and MODLM_QA, corresponding to the MOD29 5-minute granules. PGE08 also produces a BROWSE product and exports it to the NSIDC DAAC.

Production Rules

PGE08 runs once for each set of MOD03 and MOD021KM 5-minute granules. The required inputs are MOD03, MOD021KM, and MOD35_L2. The operational scenario is nominally 288 activations per day, representing the processing of one granule per PGE run. Three of the SDSs in the sea ice product are available only for input granules with day-mode data. Thus the MOD29 output file sizes for this PGE are variable. The current plans specify processing MODIS data located between 40 to 90 degrees latitude for the Northern Hemisphere and 50 to 90 degrees for the Southern Hemisphere for every day of the year.

The Production Rules for PGE08 are:

- Basic Temporal,
- Metadata Based Query.

Data Files

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250 and 1km (R) 1

Dynamic Product Output ESDT

MOD29	MODIS/Terra Sea Ice Extent 5-Min L2 Swath 1km (A _M) (A _D) 1
MOD29L2C	MODIS/Terra Coarse Sea Ice Extent 5-Min L2 Swath 5km (I _M) 1
BROWSE	MODIS/Terra Browse Products (A _M) (A _D) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

ALGORITHM_PACKAGE_ACCEPTANCE_DATE	<Date on which the Science Discipline Group accepted the algorithm used in the processing code to make the product>
ALGORITHM_PACKAGE_MATURITY_CODE	<Classification of maturity of the algorithm code as determined by the Science Discipline Group>
ALGORITHM_PACKAGE_NAME	<Name of the algorithm used in the processing code>
ALGORITHM_PACKAGE_VERSION	<Version of the algorithm used in the processing code>
PGE08 Version	<Version of PGE08 that appears in the ciList delivered with the code>
REPROCESSING_PLANNED	"further update is anticipated"
REPROCESSING_ACTUAL	"reprocessed"

4.9 Level 2 Ocean Color (PGE09)

PGE09 is the first step in the L2 and L3 space-binning Ocean Color processing of the MODIS data executed at MODAPS.

Purpose

PGE09 produces the MODIS Ocean Color (MODOCL2, MODOCL2A, MODOCL2B, MODOCQC) L2 products, L3 space-binned products (MODOCB_{nn}, where nn = parameters 1...36) and L3 QC products (MODOQB_{qq}, where qq = parameters 51...61 or 63...66).

Structure

PGE09 consists of the Ocean Color L2 process (MOD_PR18), MODIS Oceans Space Binner process (MOD_PRmsbin), and a Level 2 subsetter (MOD_PRmsub). Figure 4-4 shows the structure of PGE09.

MODAPS Production

For Terra processing PGE09 is run in MODAPS Recipe AM1M_O1, which is executed upon the availability of MOD021KM, MOD03, MOD28L2, MOD28QC, MODOCNMC, MODOCOZN, and predicted ephemeris (AM1EPHH) granules covering the processing period. For Aqua processing PGE09 is run in MODAPS Recipe PM1M_O1, which is executed upon the availability of MYD021KM, MYD03, MODOCNMC, MODOCOZN, MODOCREY, and predicted ephemeris (PM1EPHH) granules covering the processing period. Products archived at MODAPS are MODOCL2, MODOCL2A, MODOCL2B, MODOCB_{nn} (where nn = parameters 1-36), MODOQB_{qq} (where qq = parameters 51...61, 63...66), and MODOCQC. PGE09 produces a maximum of 2 granules for 2 data days of MODOCB_{nn} for each of its 36 parameters and 2 granules for 2 data days of MODOQB_{qq} for each of its 15 parameters. MODAPS exports MODOCL2, MODOCL2A, MODOCL2B, and MODOCQC to the PDR Server for archive and distribution at the GES DAAC. MODAPS Interim products for the same period are granules of MODOCB_{nn}, MODOQB_{qq}, and the subsetted Level 2 products.

Production Rules

PGE09 runs once for each input 5-minute MODIS L1B day-mode and mixed-mode granule to generate products for one of the output parameters. For Terra processing, the required MODIS inputs are MOD021KM, MOD03, MOD28L2, and MOD28QC. For Aqua processing, the required MODIS inputs are MYD021KM and MYD03.

For both Terra and Aqua processing, PGE09 is also dependent upon external ancillary files that must be available and preprocessed through the Oceans Ancillary Meteorological Preprocess (PGE17) and the Oceans Ancillary Ozone Preprocess (PGE19) before processing begins for PGE09. At the beginning of the Terra Mission, the external ancillary REYNSST was also a required input. After the Terra Level 2 SST

products were validated, they replaced the REYNSST as required input. REYNSST is now preprocessed by MODIS Oceans PGE18 for input to the L2 Oceans PGEs as MODOCREY.

MODOCNMC is produced in six-hour granules from the 1 degree NCEP GDAS data by PGE17. This preprocessor re-grids the data and converts the data from GRIB to HDF-EOS format. These ancillary data must be staged for the time covering \pm six hours of the current MODIS granule being processed. Thus, three files are staged. MODOCOZN is produced in daily granules from the TOMS Column Ozone (Earth Probe) data by PGE19. This preprocessor smooths the data and converts the data from ASCII to HDF-EOS format. These ancillary data must be staged for the time covering the current MODIS granule being processed, the previous day, and the following day. Thus, three files are required.

For Aqua processing PGE09 requires the preprocessed REYNSST, MODOCREY, to be available before processing begins. MODOCREY will be input to PGE09 until the Aqua MODIS L2 SST products (MYD28L2 and MYD28QC) have been validated. In order to produce MODIS Oceans L2 products in the same time frame as other L2 products that do not use the weekly Reynolds file, the previous weekly file is preprocessed and staged rather than wait for the current weekly file. If the file from the previous week is not available, then the next file back in time is staged. Thus the nearest available MODOCREY weekly file is staged. The Advanced Temporal Production Rule is required to set negative deltas to the start of the processing period and positive deltas to the end of the processing period to acquire all of the ancillary data files needed.

PGE09 also requires the three previous, the current, and the next three days of orbital (ephemeris) files for data day calculations. MODAPS stages seven days of predicted Terra AM1EPHH or Aqua PM1EPHH, from PGE 76, with day 4 overlapping the current processing period. PGE76 generates the following predicted ephemeris files for the current day's processing:

- AM1EPHH or PM1EPHH corresponding to the current day;
- AM1EPHH1 or PM1EPHH1 for subsequent day 1;
- AM1EPHH2 or PM1EPHH2 for subsequent day 2;
- AM1EPHH3 or PM1EPHH3 for subsequent day 3,

For a current run of PGE09, MODAPS stages the above four files and three previous days of AM1EPHH or PM1EPHH. The following day, PGE76 writes a new set of current and predicted ephemeris files as above. MODAPS then stages the new current day AM1EPHH or PM1EPHH, three previous days of the same ESDT, and the new "H1", "H2", and "H3" files.

The Space Binner Process (MOD_PRmsbin) requires the orbit files for 6 hours of time starting before and 6 hours beyond the current processing period to calculate the boundaries between the Ocean Data Days. MOD_PRmsbin writes the start dataday and end dataday PSAs into the output spaced-binned products. This process also sets several related metadata attributes. It sets the PSA AscendingDescendingFlg to "descending" for day mode data and "ascending" for night mode data and sets the

DayNightFlag to “Day” when solar zenith angles are less than 90 degrees and to “Night” when solar zenith angles are greater than 90 degrees. For granules with solar zenith angles both greater and less than 90 degrees, it sets the DayNightFlag to “Day” if more than half of the scans in the granules have solar zenith angles less than 90 degrees. Otherwise PGE09 does not process these data.

PGE09 produces 5-minute granules of the first ocean color products (MODOCL2, MODOCL2A, MODOCL2B), the quality control file (MODOCQC), the first products of 36 space-binned ocean color parameters (MODOCB_{nn}), and 15 space binned ocean color QC parameters (MODOQB_{qq}). Because the input 5-minute MODIS granules may span several Ocean Data Days, two output space-binned 5-minute granules of MODOCB_{nn} and MODOQB_{qq} maybe produced for each ocean parameter. Since the overlap may be before or after the current Data Day being processed, 3 spaces in the PCF are reserved for possible output files of these space-binned products. MODOQB and MODOCB are produced only for granules with descending node scans.

PGE09 also runs the Ocean cutout process, MOD_PRmsub. This routine creates “cookie-cutout” HDF files for specified parameters at specified locations. MOD_PRmsub reads the Level 2 products and subsets these files for specified rectangular areas around the sites of interest. The cutout files are similar in format to the MODOCL2, MODOCL2A, and MODOCL2B files, but they contain only three SDSs: the selected parameter, longitude, and latitude. Future modifications may permit multiple SDSs, i.e., more than one selected parameter, within each output. Additional metadata to denote the site and the subsetted parameters are also included in the cutout files. These files are denoted by substitution of a “C” into the ESDT name. For example, MOCOCL2A will be the cutout file of MODOCL2A. At present there are no plans to archive the cutout products at the GES DAAC. These products will only be archived at MODAPS and exported to an FTP site for use by science groups.

Since only day-mode granules are to be processed, a Metadata Based Query will be made on the MOD021KM and other input products for granules with the DayNightFlag equal to “Day” or “Both.” The operational scenario is nominally 144 activations per day, representing the processing of one day-mode granule per PGE execution.

The Production Rules for PGE09 are:

- Basic Temporal,
- Advanced Temporal,
- Metadata Based Query,
- Nearest Temporal Match.

Data Files

Static Input ESDT

MODOCRAD	MODIS/Terra Ocean Color Radiative Correction LUT
MYDOCRAD	MODIS/Aqua Ocean Color Radiative Correction LUT
MODOCAER	MODIS/Terra Ocean Color Aerosol Coefficients

MODOCBIN	MODIS/Terra Ocean Space Binning Parameters
MODOCLUT	MODIS/Terra Ocean Color Generic Input Files
MODOCRAY	MODIS/Terra Ocean Color Rayleigh Coefficients
MOD28LST	MODIS/Terra Ocean SDS List and Cutout Site Location List

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1
MODOCNMC	MODIS Preprocessed NMC Ancillary Data for Ocean Processes 6-Hr L3 Global 1Deg (Preprocessed National Meteorological Center (NMC) Ancillary 1 Degree NCEP GDAS (GDAS_0ZF) for MODIS Oceans Processing; converted from GRIB to HDF-EOS Format.) (R) 3
MODOCOZN	MODIS Preprocessed TOMS Ozone Data for Ocean Processes Daily L3 Global 1x1.25Deg (Preprocessed TOMS Column Ozone Data for Oceans processing; converted from ASCII to HDF-EOS Format.) (R) 3
MODOCREY	MODIS Preprocessed REYNSST Ancillary Data Weekly L3 Global 1x1Deg (Converted from Binary to HDF-EOS Format for MODIS Oceans Processing.) (R) 1
MOD28L2	MODIS/Terra Sea Surface Temperature Products 5-Min L2 Swath 1km (for Terra processing) (R) 1
MOD28QC	MODIS/Terra Sea Surface Temperature QC Products 5-Min L2 Swath 1km (for Terra processing) (R) 1

Dynamic Ancillary Product Input

AM1EPHH	MODIS/Terra Current Day Predicted Ephemeris Daily (Spacecraft ephemeris/orbit data files to be read via SDP Toolkit. PGE09 will use 24-hour predicted ephemeris files generated from an actual AM1EPHN0 file; AM1EPHH files are MODAPS specific and are produced as AM1EPHH for current day and AM1EPHH{1,2,3} for subsequent days.) (R) 7
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PM1EPHH	MODIS/Aqua Current Day Predicted Ephemeris Daily (Spacecraft ephemeris/orbit data files to be read via SDP Toolkit. PGE09 will use 24-hour predicted ephemeris files generated from an actual PM1EPHND file; PM1EPHH files are MODAPS specific and are produced as PM1EPHH for current day and PM1EPHH{1,2,3} for subsequent days.) (R) 7
leapsec.dat	Data file used by the SDP Toolkit that relates leap second (TAI-UTC) values to UTC Julian dates
utcpole.dat	Data file used by the SDP Toolkit that relates UT1-UTC values to UTC dates

Dynamic Product Output ESDT

MODOCL2	MODIS/Terra Ocean Color Radiance Products 5-Min L2 Swath 1km Day (A_M) (A_D) 1
MODOCL2A	MODIS/Terra Ocean Color Derived Products Group 1 5-Min L2 Swath 1km Day (A_M) (A_D) 1
MODOCL2B	MODIS/Terra Ocean Color Derived Products Group 2 5-Min L2 Swath 1km Day (A_M) (A_D) 1
MODOCB _{nn}	MODIS/Terra Ocean Color Space-Binned Composite Params 1-36 5-Min L3 Global 1km ISEAG (where nn = parameters 1-36) (A_M) 2*
MODOQB _{qq}	MODIS/Terra Ocean Color Space-Binned Composite QC Products 5-Min L3 Global 1km ISEAG (where qq = parameters 51-61, 63-66) (A_M) 2*
MOCOCL2	MODIS/Terra Ocean Color Radiance Subsetted Products 5-Min L2 Swath 1km Day (A_M) 1
MOCOCL2A	MODIS/Terra Ocean Color Derived Subsetted Products Group 1 5-Min L2 Swath 1km Day (A_M) 1
MOCOCL2B	MODIS/Terra Ocean Color Derived Subsetted Products Group 2 5-Min L2 Swath 1km Day (A_M) 1

*per parameter

Quality Control Output ESDT

MODOCQC	MODIS/Terra Ocean Color QC Products 5-Min L2 Swath 1km Day (A _M) (A _D) 1
MOCOCQC	MODIS/Terra Ocean Color QC Subsetted Products 5-Min L2 Swath 1km Day (A _M) 1

Dynamic Runtime Parameters for Operations

start dataday	<Start Day for Data Observations(yyyyddd)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	0
	PGEVersion <Version of PGE09 that appears in the CiList delivered with the code>

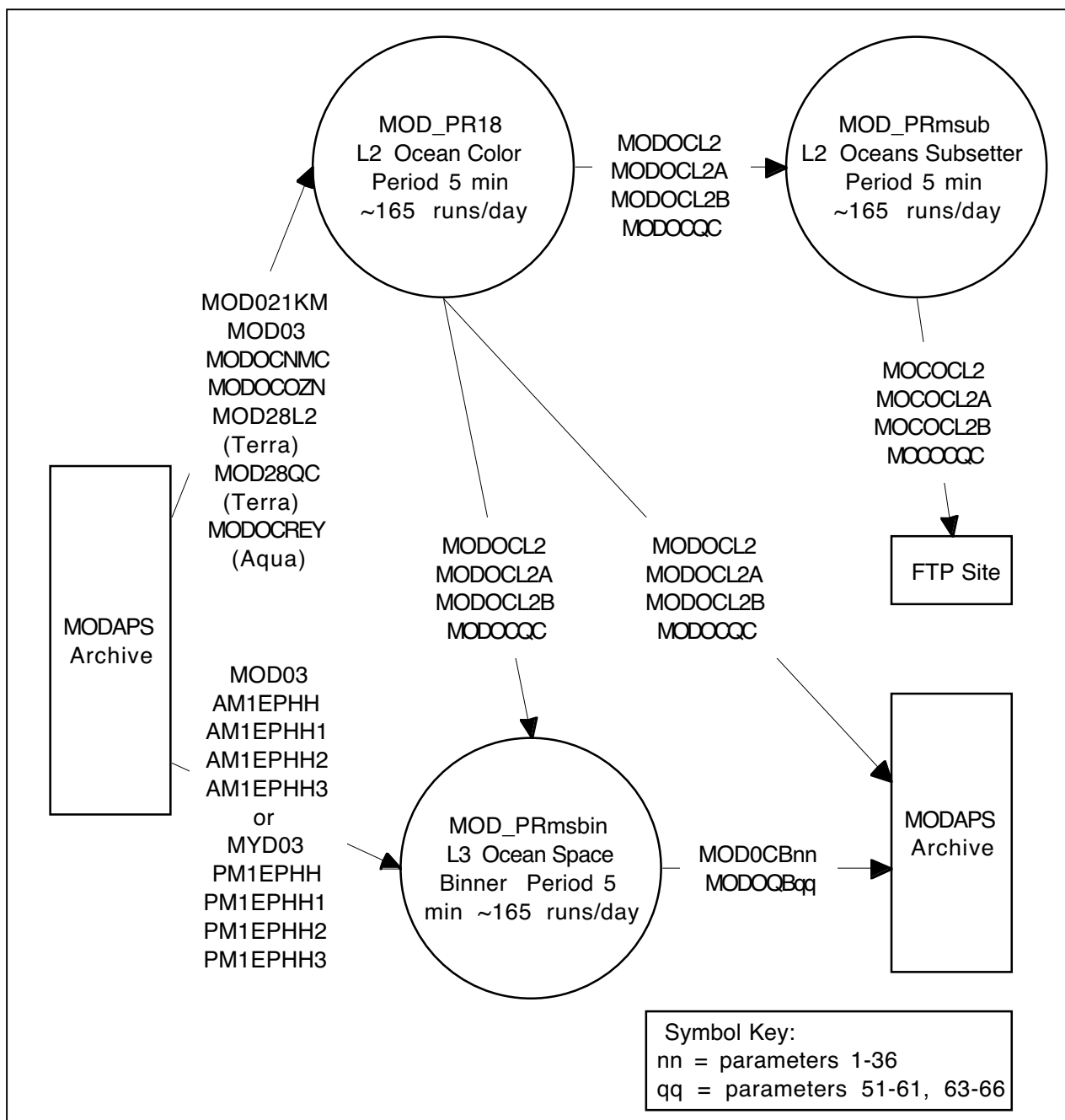


Figure 4-4 PGE09 Structure

4.10 Level 2 Sea Surface Temperature (PGE10)

PGE10 consists of the Oceans L2 and L3 Space-binning Sea Surface Temperature (SST) processing executed at MODAPS.

Purpose

PGE10 produces the SST L2 products (MOD28L2, MOD28QC), L3 space-binned products (MOD28B_{mm}, where mm is D1, D2 (may be produced and archived again in the future), N1, or N2), and L3 QC products (MODSQB_{rr}, where rr is D1...D9, DA, N1...N9, or NA).

Structure

PGE10 consists of the Sea Surface Temperature L2 process (MOD_PR28), Oceans Space Binner process (MOD_PRmsbin), and a Level 2 subsetter (MOD_PRmsub). Figure 4-5 shows the structure of PGE10.

MODAPS Production

PGE10 is run in MODAPS Recipe AM1M_O1, which is executed every two hours upon the availability of MOD021KM, MOD03, MODOCNMC, MODOCOZN, MODOCREY, and predicted ephemeris (AM1EPHH) granules covering the processing period. Products archived at MODAPS are MOD28L2, MOD28B_{mm} (where mm = parameters D1, N1, N2), MODSQB_{rr} (where rr = parameters D1-D9, DA, N1-N9, NA) and MOD28QC. PGE10 produces a maximum of 2 granules of MOD28B_{nn} for each of its 3 parameters and 2 granules of MODSQB_{rr} for each of its 20 parameters. MODAPS exports MOD28L2 and MOD28QC to the PDR Server for archive and distribution at the GES DAAC. MODAPS Interim products for the same period are granules of MOD28B_{mm}, MODSQB_{rr}, and the subsetted Level 2 products. MOD28BD2 is generated but is no longer archived at MODAPS; it is treated as a temporary file and deleted at the end of the PGE10 run.

Production Rules

PGE10 runs once for each 5-minute MODIS L1B granule to generate products for one of the output parameters. The required MODIS inputs are MOD021KM and MOD03. PGE10 is also dependent upon ancillary files that must be available and pre-processed through the Oceans Ancillary Meteorological Preprocess (PGE17), the Oceans Ancillary Reynolds Sea Surface Temperature Preprocess (PGE18), and the Oceans Ancillary Ozone Preprocess (PGE19) before processing begins for PGE10.

MODOCNMC is produced in six-hour granules from the 1 degree NCEP GDAS data by PGE17. This preprocessor re-grids the data and converts the data from GRIB to HDF-EOS format. These ancillary data must be staged for the time covering \pm six hours of the current MODIS granule being processed. Thus, three files are staged. MODOCREY is produced in weekly granules from the REYNSST Sea Surface Temperature data by

PGE18. In order to produce MODIS Oceans L2 products in the same time frame as other L2 products that do not use the weekly Reynolds file, the previous weekly file is staged rather than wait for the current weekly file. If the file from the previous week is not available, then the next file back in time is staged. Thus the nearest available REYNSST weekly file is staged. MODOCOZN is produced in daily granules from the TOMS Column Ozone (Earth Probe) data by PGE19. This preprocessor smooths the data and converts the data from ASCII to HDF-EOS format. These ancillary data must be staged for the time covering the current MODIS granule being processed the previous day, and the following day. Thus, three files are required. The Advanced Temporal Production Rule is required to set negative deltas to the start of the processing period and positive deltas to the end of the processing period to acquire all of the ancillary data files needed.

PGE10 also requires the three previous, the current, and the next three days of orbital ephemeris files for data day calculations. MODAPS stages seven days of predicted AM1EPHH from PGE76, with day 4 overlapping the current processing period. PGE76 generates the following predicted ephemeris files for the current day's processing:

- AM1EPHH or PM1EPHH corresponding to the current day;
- AM1EPHH1 or PM1EPHH1 for subsequent day 1;
- AM1EPHH2 or PM1EPHH2 for subsequent day 2;
- AM1EPHH3 or PM1EPHH3 for subsequent day 3,

For a current run of PGE10, MODAPS stages the above four files and three previous days of AM1EPHH or PM1EPHH. The following day, PGE76 writes a new set of current and predicted ephemeris files as above. MODAPS then stages the new current day AM1EPHH or PM1EPHH, three previous days of the same ESDT, and the new "H1", "H2", and "H3" files.

The orbit data are required inputs. The Advanced Temporal Production Rule is also required for the previous and next days of orbit data. Deltas for the beginning and end of these files are set using the same algorithm as for instrument science data.

The Space Binner process (MOD_PRmsbin) requires the orbit files for a period of 20 hours before and 6 hours beyond the current processing period to calculate the boundaries between the Ocean Data Days. MOD_PRmsbin process writes the start dataday and end dataday PSAs into the output products. This process also sets several related metadata attributes. It sets the PSA AscendingDescendingFlg to "descending" for day mode data and "ascending" for night mode data and sets the DayNightFlag to "Day" when solar zenith angles are less than 90 degrees and to "Night" when solar zenith angles are greater than 90 degrees. For granules with solar zenith angles both greater and less than 90 degrees, it sets the DayNightFlag to "Day" if more than half of the scans in the granules have solar zenith angles less than 90 degrees. Otherwise PGE10 sets the flag to "Night".

PGE10 produces 5-minute granules of the first Ocean Sea Surface Temperature products (MOD28L2), the quality control file (MOD28QC), and the first products of two space-binned Sea Surface Temperature parameters for day and night mode granules

(MOD28B_{D1}, MOD28B_{D2}, MOD28B_{N1}, MOD28B_{N2}). The MOD28BD2 are treated as temporary files that are deleted at the end of the PGE10 run. PGE10 also produces space-binned Sea Surface Temperature QC parameters (MODSQB_{rr}) for day and night mode in 5-minute granules. Because the input 5-minute MODIS granules may span several Ocean Data Days, two space-binned, 5-minute granules of MOD28B_{mm} and MODSQB_{rr} maybe produced for each ocean parameter. Since the overlap may be before or after the current Data Day being processed, 3 spaces in the PCF are reserved for possible output files of these space-binned products. The operational scenario is nominally 288 activations per day, representing the processing of one 5-minute granule per PGE execution.

PGE10 also runs the Ocean cutout process, MOD_PRmsub. This routine creates “cookie-cutout” HDF files for specified parameters at specified locations. MOD_PRmsub reads the Level 2 products and subsets these files for specified rectangular areas around the sites of interest. The cutout files are similar in format to the MOD28L2 files, but contain only three SDSs: the selected parameter, longitude, and latitude. Future modifications may permit multiple SDSs, i.e., more than one selected parameter, within each output. Additional metadata to denote the site and the subsetted parameters are also included in the cutout files. These files are denoted by substitution of a “C” into the ESDT name. For example, MOC28L2 will be the cutout file of MOD28L2. At present there are no plans to archive the cutout products at the GES DAAC. These products will only be archived at MODAPS and exported to an FTP site for use by science groups.

The Production Rules for PGE10 are:

- Basic Temporal,
- Advanced Temporal,
- Nearest Temporal Match.

Data Files

Static Input ESDT

MOD28RAD	MODIS/Terra Ocean SST Radiative Correction LUT
MYD28RAD	MODIS/Aqua Ocean SST Radiative Correction LUT
MOD28LUT	MODIS/Terra SST Generic Input Files
MOD28PAR	MODIS/Terra SST Parameters
MODOCBIN	MODIS/Terra Ocean Space Binning Parameters
MOD28LST	MODIS/Terra Ocean SDS List and Cutout Site Location List

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath (R) 1
MODOCNMC	MODIS Preprocessed NMC Ancillary Data for Ocean Processes 6-Hr L3 Global 1Deg (Preprocessed National Meteorological Center (NMC) Ancillary 1 Degree NCEP GDAS (GDAS_0ZF) for MODIS Oceans Processing; converted from GRIB to HDF- EOS Format.) (R) 3
MODOCOZN	MODIS Preprocessed TOMS Ozone Data for Ocean Processes Daily L3 Global 1x1.25Deg (Preprocessed TOMS Column Ozone Data for Oceans processing; converted from ASCII to HDF-EOS Format.) (R) 3
MODOCREY	MODIS Preprocessed REYNSST Ancillary Data Weekly L3 Global 1x1Deg (Converted from Binary to HDF-EOS Format for MODIS Oceans Processing.) (R) 1

Dynamic Ancillary Product Input

AM1EPHH	Spacecraft ephemeris/orbit data files to be read via SDP Toolkit (PGE10 will use 24-hour predicted ephemeris files generated from an actual AM1EPHN0 file; AM1EPHH files are MODAPS specific and are produced as AM1EPHH for current day and AM1EPHH{1,2,3} for subsequent days.) (R) 7
PM1EPHH	MODIS/Aqua Current Day Predicted Ephemeris Daily (Spacecraft ephemeris/orbit data files to be read via SDP Toolkit. PGE09 will use 24-hour predicted ephemeris files generated from an actual PM1EPHND file; PM1EPHH files are MODAPS specific and are produced as PM1EPHH for current day and PM1EPHH{1,2,3} for subsequent days.) (R) 7
leapsec.dat	Data file used by the SDP Toolkit that relates leap second (TAI-UTC) values to UTC Julian dates
utcpole.dat	Data file used by the SDP Toolkit that relates UT1- UTC values to UTC dates

Dynamic Product Output ESDT

MOD28L2	MODIS/Terra Sea Surface Temperature Products 5-Min L2 Swath 1km (A _M) (A _D) 1
MOD28B _{mm}	MODIS/Terra Sea Surface Temperature Space-Binned Composite Params 5-Min L3 Global 1km ISEAG (where mm = parameters D1, D2, N1, N2; D2 is deleted after PGE run is completed.) (A _M) 2*
MODSQB _{rr}	MODIS/Terra Sea Surface Temperature Space-Binned Composite QC Products 5-Min L3 Global 1km ISEAG (where rr = parameters D1-D9, DA, N1-N9, NA) (A _M) 2*
MOC28L2	MODIS/Terra Sea Surface Temperature Subsetted Products 5-Min L2 Swath 1km (A _M) 1

*per parameter

Quality Control or Diagnostic Output ESDT

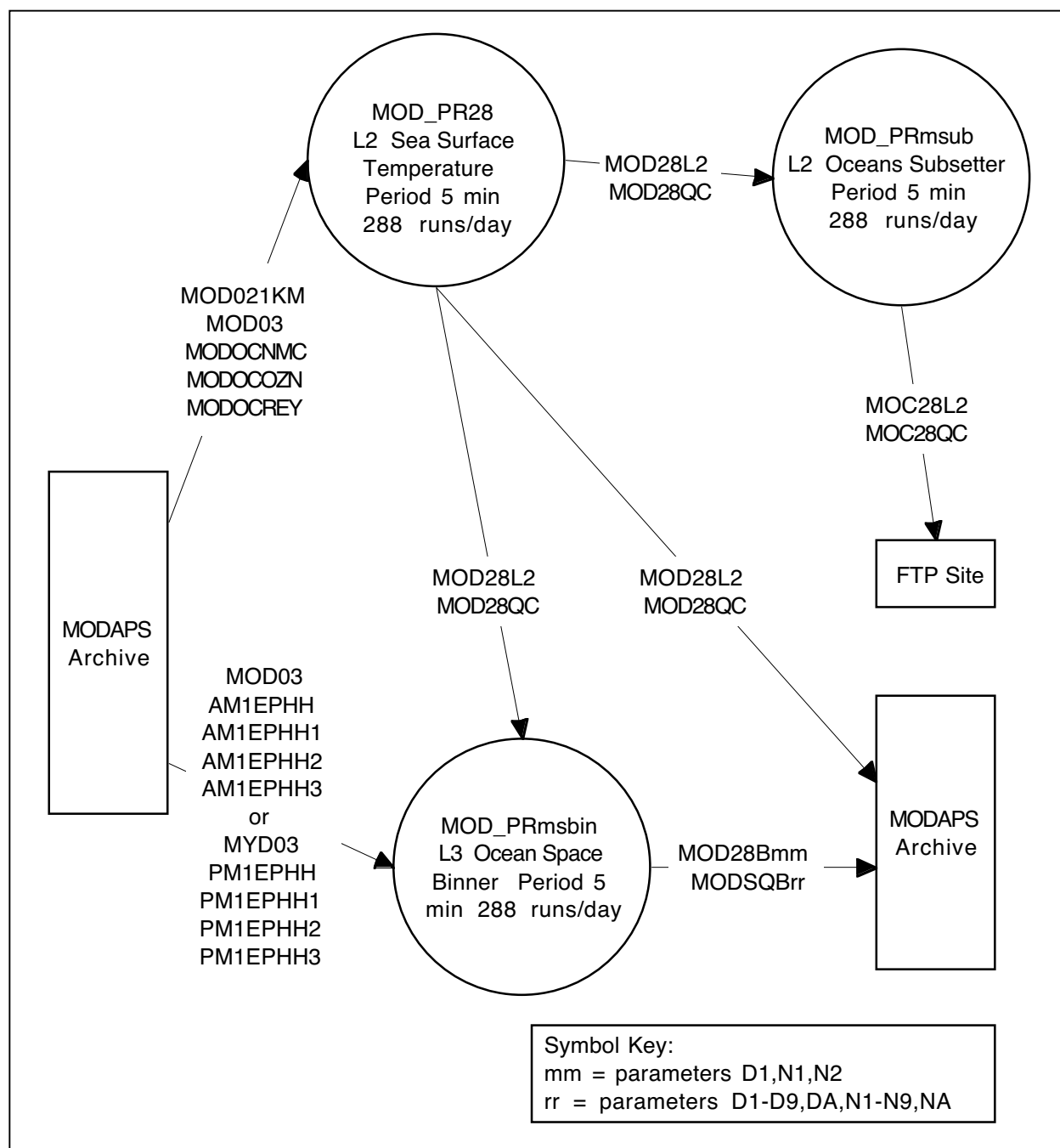
MOD28QC	MODIS/Terra Sea Surface Temperature QC Products 5-Min L2 Swath 1km (A _M) (A _D) 1
MOC28QC	MODIS/Terra Sea Surface Temperature QC Subsetted Products 5-Min L2 Swath 1km (A _M) 1

Dynamic Runtime Parameters for Operations

start dataday	<Start Day for Data Observations(yyyyddd)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	0
subsamplex	0
subsampley	0
PGEVersion	<Version of PGE10 that appears in The ciList delivered with the code>

**Figure 4-5 PGE10 Structure**

4.11 Level 2 Land Surface Reflectance (PGE11)

PGE11 performs processing for L2 Land Surface Reflectance at MODAPS.

Purpose

PGE11 produces Land L2 products, namely L2 Surface Reflectance (MOD09) and coarse resolution Surface Reflectance (MOD09CRS). It also produces the Land QA product (MODLM_QA), the L1B averaged coarse resolution product (MOD02CRS), the L1B sub-sampled coarse resolution product (MOD02CSS) and the interim surface reflectance for North Polar, South Polar and non-polar regions (MOD09IDN, MOD09IDS, and MOD09IDT).

Structure

PGE11 consists of three processes: MOD_PR09, MOD_PR02CRS, and the Land QA process (MOD_PRLQA).

MODAPS Production

The MODAPS Recipe plan containing PGE11 is submitted each day. There is no requirement that all input granules be available at the time of submittal. PGE11 is run in MODAPS Recipe AM1M_L3, which is executed once every orbit upon the availability of the L1B products (MOD021KM, MOD02HKM, MOD02QKM), the Geolocation product (MOD03), and the Cloud Mask (MOD35_L2) for the orbital period. Matching GDAS_0ZF and OZ_DAILY must also be available. Products archived at MODAPS are a set of up to 24 granules of MOD09, with DayNightFlag set to "Daytime" or "Both", covering the orbital period. MODAPS Interim products for the same period, for both day and night mode data, are a maximum of 24 granules of MOD09CRS, 24 granules of MOD02CRS, 24 granules of MOD02CSS, and 24 granules of MODLM_QA per orbital period and 1 orbital granule each of MOD09IDN, MOD09IDS, and MOD09IDT.

Production Rules

PGE11 runs once for each orbit of MODIS data granules. The only required MODIS input is MOD021KM. MOD02HKM, MOD02QKM, MOD35_L2, and MOD03 are optional inputs. Both day and night mode data covering the orbital period are staged for PGE11. Up to 24 granules may be staged, but PGE11 selects the granules in the current orbital processing period according to the orbit start and end times that are passed as runtime parameters to the PGE by MODAPS. Only about 18 to 20 granules will actually be produced for MOD09CRS and sometimes less for MOD09 which is only output for daytime. For every temporally-matched set of day-mode input granules, PGE11 will output one granule of MOD09 if there is day time data and one granule in either day or night modes for MOD09CRS, MOD02CRS, and MOD02CSS. PGE11 also will output one orbital granule of the interim MOD09IDN, MOD09IDS, and MOD09IDT. After a time-out period for the required input MOD021KM to become available at MODAPS, PGE11 will run using the available granules for the orbit, with a minimum of one granule. The wait time for running PGE11 is to be set initially to 72 hours.

The ancillary data sets that are used in standard production are GDAS_0ZF and OZ_DAILY. For each run of PGE11, MODAPS is required to stage all four files of the 6-hour GDAS_0ZF for the day corresponding to the start time of the orbit and all four files of GDAS_0ZF for the next day. For each run of PGE11, MODAPS is required to stage the OZ_DAILY file for the day corresponding to the start time of the orbit. If the start time of the orbit is 12:00 or earlier, MODAPS also stages the OZ_DAILY file for the previous day and if the end time of the orbit is 12:00 or later, MODAPS also stages the OZ_DAILY file for the day following the end of the orbit. Using the Advanced Temporal Production Rule, delta times are specified to the start and end of the orbital processing period to retrieve the ancillary files that best match the orbital period. The algorithms for setting the delta times in the start and end of the data processing period for these ancillary data sets are described in Section 5.8, Advanced Temporal Production Rule. The code has static climatological data files and internal models as backups if the dynamic ancillary data are not available when the processing begins.

In addition to the runtime parameter indicating the satellite platform, PGE11 has two dynamic runtime parameters for staging data: STARTTIME and ENDTIME. For PGE11 these are the start and end times for the orbit.

The Production Rules for PGE11 are:

- Orbit-Based Activation,
- Advanced Temporal,
- Optional Inputs,
- Minimum Number of Granules,
- Runtime Parameters.

Data Files

Static Input ESDT

MOD09LU1	MODIS/Terra Aerosol Transmittance LUTs for Production of MOD09 Products
MOD09LU2	MODIS/Terra Concentration LUTs for Production of MOD09 Products
MOD09LU3	MODIS/Terra Various LUTs for Production of MOD09 Products

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD02HKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 500m (O) 0
MOD02QKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 250m (O) 0

MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath (O) 0
-------	---

MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km (O) 0
----------	---

Dynamic Ancillary Product Input ESDT

GDAS_0ZF	NCEP GDAS Meteorological Data GRIB Format 6-Hr L3 Global 1Deg Lat/Lon (R) 8
----------	--

OZ_DAILY	NCEP TOVS Column Ozone GRIB Format Daily L3 Global 1Deg Lat/Lon (R) 2
----------	--

Dynamic Product Output ESDT

MOD09	MODIS/Terra Surface Reflectance 5-Min L2 Swath 250m, 500m and 1km (A _M) 24 *
-------	---

MOD09CRS	MODIS/Terra Coarse Surface Reflectance 5-Min L2 Swath 5km (I _M) 24 *
----------	---

MOD02CRS	MODIS/Terra Coarse Calibrated Radiances 5-Min L2 Swath 5km (I _M) 24 *
----------	--

MOD02CSS	MODIS/Terra Subsampled Coarse Calibrated Radiances 5-Min L2 Swath 5km (I _M) 24 *
----------	---

MOD09IDN	MODIS/Terra Interim Surface Reflectance North Polar Region 1 Orbit L3 5km CMG (I _M) 1*
----------	---

MOD09IDS	MODIS/Terra Interim Surface Reflectance South Polar Region 1 Orbit L3 5km CMG (I _M) 1*
----------	---

MOD09IDT	MODIS/Terra Interim Surface Reflectance Non-Polar Region 1 Orbit L3 5km CMG (I _M) 1*
----------	---

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 24*
----------	--

* Maximum number of granules for one orbit selected by orbit start and end time.

Dynamic Runtime Parameters for Operations

STARTTIME	<Start time of input data (start time of orbit)> *
-----------	--

ENDTIME	<End time for input data (end time of orbit)> *
---------	---

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
---------------------	--

ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>
-----------------------	--

Static Runtime Parameters for Operations

adja_on: 1=enable 0=disable	0
brdf_mode; 0=none 1=Montana 2=Boston	0
lam_cor; 0=disable 1= enable	1
REPROCESSINGACTUAL metadata field	"reprocessed"
REPROCESSINGPLANNED metadata field	"further update is anticipated"
LOCALGRANULEIDVERSION	<Version of product>
process 250m data band 1; 1=yes, 0 = no	1
process 250m data band 2; 1=yes, 0=no	1
process 500m data band 1; 1=yes, 0 = no	0
process 500m data band 2; 1=yes, 0 = no	0
process 500m data band 3; 1=yes, 0 = no	1
process 500m data band 4; 1=yes, 0 = no	1
process 500m data band 5; 1=yes, 0 = no	1
process 500m data band 6; 1=yes, 0 = no	1
process 500m data band 7; 1=yes, 0= no	1
process 1km data band 1; 1=yes, 0 = no	1
process 1km data band 2; 1=yes, 0 = no	1
process 1km data band 3; 1=yes, 0 = no	1
process 1km data band 4; 1=yes, 0 = no	1
process 1km data band 5; 1=yes, 0 = no	1
process 1km data band 6; 1=yes, 1 = no	1
process 1km data band 7: 1=yes, 0 = no	1
produce coarse resolution 11b by average; 1 = yes, 0 = no	1
produce coarse resolution 11b by subsample; 1 = yes, 0 = no	1
produce coarse resolution product; 1=yes, 0=no	1
produce fire product; 1=yes, 0=no	0
process sea pixels; 1=yes, 0=no	1
scans to process; -1 = process all scans	-1
force internal cloud mask for reflectance 1=yes 0=no	0
force internal cloud mask for fire 1=yes 0=no	0
use MODIS AOT 0=no 1=yes	1
PGE Version number	<Version of PGE11 that appears in the ciList delivered with the code>
mid-IR fire coefficient	4.000
mid-IR fire power	0.1000
mid-IR fire threshold	0.10000
mid-IR fire threshold in glint	0.1500
mid-IR fire correction coefficient	0.25000
mid-IR fire correction power	2.0000
thermal anomaly threshold	-5.0
thermal anomaly threshold in glint	10.0
glint threshold	0.05000
make CMG files; 0=no, 1=yes	1

4.12 Level 2G Pointers (PGE12)

PGE12 supports the L2G land processing at MODAPS by creating the pointer maps from granules to Land tiles and the associated geolocation angles.

Purpose

PGE12 produces some of the files required for L2G land processing, namely the L2G pointer maps in the Sinusoidal projection at three resolutions: 1km (MODPT1KD, MODPT1KN), 500m (MODPTHKM), and 250m (MODPTQKM) and the L2G pointer maps in the EASE-Grid polar projection at 1 km resolution (MODPTPGD and MODPTPGN). It also produces the tiled geolocation angular data (MODMGGAD, MODMGGAN) in Sinusoidal projection, tiled geolocation angular data (MODMGPGD) in EASE-Grid polar projection, the Land QA product (MODLM_QA), and the subsetting products (MOD_SS). The 1 km pointers and geolocation angles are produced in day and night mode. Currently MODMGGAN is not needed for downstream products and its production may be deleted.

Structure

PGE12 consists of the L2G pointer map process (MOD_PRMGPNTR) which produces the pointers at three resolutions, the tiled geolocation angular data process (MOD_PRMGR) which produces the L2G Geolocation Angles, and the Land QA process (MOD_PRLQA). PGE12 also runs the Land shared MOD_PRSS.pl Script to produce the subsetting products. Figure 4-6 shows the structure of PGE12.

MODAPS Production

PGE12 runs in MODAPS Recipe AM1M_L5 to make SIN Grid products and in MODAPS Recipe AM1M_L5P to make EASE-Grid products. These recipes are executed every day upon the availability of MOD03 granules covering the daily processing period. Currently MODAPS runs four PGE profiles to produce combinations of day and night mode daily L2G products, combinations of 500m and 1km resolutions, and two grid schemes. The profiles are shown below.

Products archived at MODAPS are the daily L2G granules of MODMGGAD, MODMGGAN(to be removed), MODPT1KD, MODPT1KN, MODPTHKM, MODPTQKM, MODMGPGD, MODPTPGD, and MODPTPGN. The corresponding Interim products at MODAPS are MODLM_QA files for each of the pointer and geolocation angle granules and MOD_SS subsetting products. MODAPS exports MODMGGAD and the pointers MODPT1KD, MODPTHKM and MODPTQKM, selected by the tile identification, to the PDR Server for archive and distribution at the LP DAAC. Pointers and geolocation angles for nighttime Sinusoidal products and both daytime and nighttime EASE-Grid products are not currently exported.

Production Rules

After a full day of PGE01 processing has completed, each PGE12 profile runs once per Land tile per day for MOD03 geolocation granules associated with Land surface reflectance, fire, and snow in day mode in Sinusoidal projection; once per tile for sea ice data in day mode in EASE-Grid polar projection; once per tile for fire in night mode in Sinusoidal projection; and once per tile for sea ice data in night mode in EASE-Grid projection. Thus, PGE12 requires four primary profiles to make day mode and night mode sets of pointers for each resolution and sets of geolocation angles for day mode and night mode. Several tile schemes in the Sinusoidal Projection and EASE-Grid Polar Projection have been defined and registered in MODAPS. These tile schemes are listed in Table 3-8 with the MODIS Land Recipes that use them. Table 3-9 lists the L2G PGE profiles that use these tile schemes, the recipes, the input and output products, the controlling runtime parameter and values, and other relevant information.

The four profiles with output products are the following:

Profile 1	Day Mode	Sinusoidal Grid	MODMGGAD
			MODPT1KD
			MODPTHKM
			MODPTQKM
			MODLM_QA
Profile 2	Day Mode	EASE-Grid	MODMGPGD
			MODPTPGD
			MODLM_QA
Profile 3	Night Mode	Sinusoidal Grid	MODMGGAN (to be deleted)
			MODPT1KN
			MODLM_QA
Profile 4	Night Mode	EASE-Grid	MODMGPGN
			MODPTPGN
			MODLM_QA

PGE12 requires the Latitude/Longitude Tiling Production Rule. To execute PGE12, a Latitude/Longitude tile definition file must be associated with the PGE. The MODAPS Loader for PGE12 selects the tiles to be processed. For each individual execution, MODAPS will create a recipe instance with a particular Tile ID and pass the Tile ID back to the PGE as a Runtime Parameter.

The activation of any profile of PGE12 is dependent on the availability of at least one granule of the required MOD03 geolocation in the associated day and night modes for

the processing day. MOD03 is a required input. The average number of MOD03 granules is 4.5, but the number may vary from 1 to 28. The number of granules overlapping a particular tile for a daily PGE run may be as few as one or even zero. If there are zero granules, the PGE is not run for that tile. For all L2G PGEs requiring the Latitude/Longitude Tiling Production Rule, the Minimum Number of Granules will be set to a default of one.

Day and night modes are run separately in different PGE profiles. To execute one of these profiles of PGE12, the tile scheme must already be associated with the PGE profile. PGE12 profiles will be run for tiles in associated tile schemes. To stage the correct day mode input, a Metadata Based Query Production Rule is used on the geolocation (MOD03) granules' metadata attribute DayNightFlag with values of either "Day" or "Both." To stage the correct night mode input, the query retrieves granules with DayNightFlag set to a value of "Night."

Out of the total number of Land tiles defined over the surface of the Earth in the Sinusoidal projection, 130 of these are sea ice. However, sea ice products are being made in EASE-Grid. There are a total of 353 EASE-Grid polar tiles defined for sea ice but due to a geographic cutoff defined by the SCF, sea ice products are generated for only 210 of these tiles.

The operational scenarios for all profiles of PGE12 range from a maximum of about 360 to 286 land product and 210 sea ice activations for day mode and night mode, representing the processing of one tile per PGE execution. The geolocation angular data process (MOD_PRMGR) and Land QA process (MOD_PRLQA) are executed after the L2G pointer map process (MOD_PRMGPNTNTR) for each profile. MOD_PRSS then makes the subsetted products.

The Production Rules for PGE12 are:

- Period Specification,
- Latitude/Longitude Tiling,
- Metadata Based Query,
- Minimum Number of Granules (defaulted to 1),
- Runtime Parameters.

Data Files

Dynamic Product Input ESDT

MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath (R) 1
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Dynamic Product Output ESDT

MODPT1KD	MODIS/Terra Observation Pointers Daily L2G Global 1km SIN Grid Day (Selected tiles over North America are exported) (A _M) (A _D) 1
----------	---

MODPT1KN	MODIS/Terra Observation Pointers Daily L2G Global 1km SIN Grid Night (Selected tiles over North America are exported) (A _M) 1
MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m SIN Grid (Selected tiles over North America are exported) (A _M) (A _D) 1
MODPTQKM	MODIS/Terra Observation Pointers Daily L2G Global 250m SIN Grid (Selected tiles over North America are exported) (A _M) (A _D) 1
MODMGGAD	MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid Day (A _M) (A _D) 1
MODMGGAN	MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid Night (To be deleted) (A _M) 1
MODPTPGD	MODIS/Terra Polar Observation Pointers Daily L2G Global 1km EASE-Grid Day (A _M) 1
MODPTPGN	MODIS/Terra Polar Observation Pointers Daily L2G Global 1km EASE-Grid Night (A _M) 1
MODPTPHD	MODIS/Terra Observation Pointers Daily L2G 500m EASE-Grid (Not currently produced) (A _M) 1
MODMGPGD	MODIS/Terra Polar Geolocation Angles Daily L2G Global 1km EASE-Grid Day (A _M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Observation Pointers Daily L2G Global 1km SIN Grid Day (File name contains "MOD_SS.MODPT1KD" to identify the particular subsetting product.) (I _M) 1+
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Observation Pointers Daily L2G Global 1km SIN Grid Night (File name contains "MOD_SS.MODPT1KN" to identify the particular subsetting product.) (I _M) 1+
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Observation Pointers Daily L2G Global 500m SIN Grid (File name contains "MOD_SS.MODPTHKM" to identify the particular subsetting product.) (I _M) 1+
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Observation Pointers Daily L2G Global

	250m SIN Grid (File name contains "MOD_SS.MODPTQKM" to identify the particular subsetted product.) (I _M) 1 ⁺
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid Day (File name contains "MOD_SS.MODMGGAD" to identify the particular subsetted product.) (I _M) 1 ⁺

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 4 [*]
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* Maximum number of 4 per run

⁺One file produced per validation site; maximum of 15 sites allowed.

Dynamic Runtime Parameters for Operations

TileSchemeID	<Set of tiles to be produced>
TILEID	<Tile identification number (value = 8 digit integer that specifies the specific tile within the current requested tile scheme)>
TILEMODE	<Setting for generation of tiles produced in daytime or nighttime (Day = DayNightFlag setting of "Day" or "Both", Night = DayNightFlag setting of "Night")>
MAXOUTPUTRES	<Setting for highest resolution of products (operational setting for day mode="500 m"; operational setting for night mode = "1km")>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

L_PRODUCT	<Type of pointer and geolocation angle products to generate. In Day mode the resolution is 1km for Sea Ice, Fire, and Surface Reflectance; 500m for Snow Cover and Surface Reflectance. In Night Mode the resolution is 1 km for Sea Ice and Fire. (Value for Operations for day mode = "G"; for night mode = "g")>
DEEPOCNFLAG	<Setting for inclusion or exclusion of deep ocean pixels. Yes = all pixels, including Ocean, will be processed; No = Ocean pixels will not be processed. (Value for operations

coverage_min	= Yes)> <Normal percentage cover minimum to control pointer output volume (Value is set depending on tile numbers.)>
EXACTMATCH	<Requirement for exact match between number of L2 granules and those geolocation files identified as overlap files in the pointer process. Values are Y = yes, N = No. Value for day mode operations = "N"; value for night mode operation = "N">
L2GFORMAT	<Mode for L2G output format: full or compact (Value for operations = "compact")>
layer_1st_sel	<First layer selection criteria is the "maximum observation coverage" as opposed to alternative of "nearest neighbor", (Value for operations = "maximum observation coverage")>
cov_cal_method	<Coverage calculation method. (Value for operations is by area = "area")>
PNTRFORMAT	<Mode for pointer output format: full or compact (Value for operations = "compact")>
PGE12 Version	<Version of PGE12 that appears in the ciList delivered with the code>
REPROCESSINGACTUAL metadata field	"reprocessed"
REPROCESSINGPLANNED metadata field keep_all	"further update is anticipated" <Volume reduction flag that can be set to keep all observations that satisfy the selection rule. Yes = turn off reduction; No = Apply reduction. (Value for operations = No)>
ranking	<Sort observations in each cell according to the "layer_1st_sel" criteria; values: Yes/No. (Value for operations = No)>
mod_prss_infile_luns	<Lun numbers for products to be subsetted.>
mod_prss_outfile_luns	<Lun numbers for output subsetted products.>

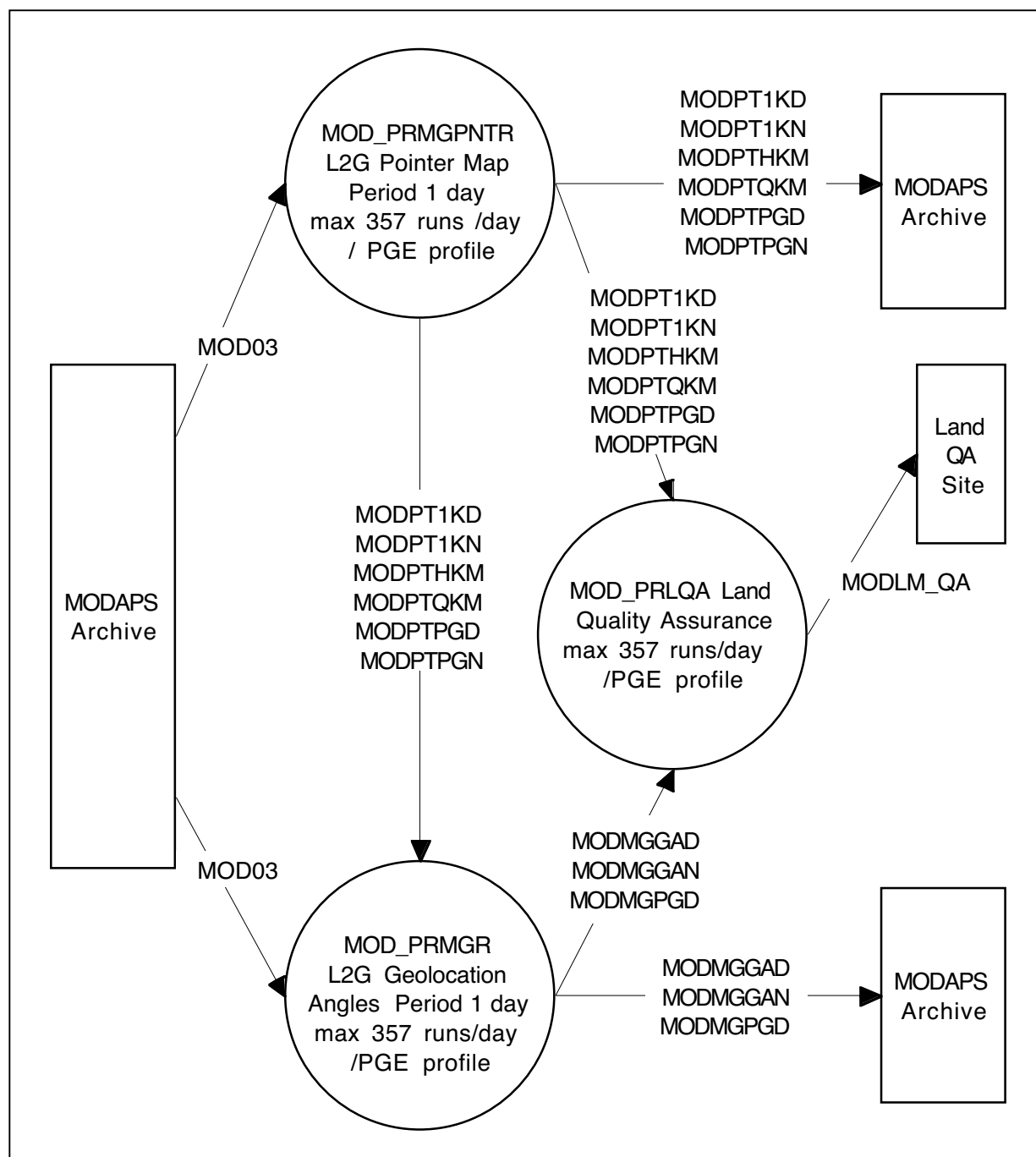


Figure 4-6 PGE12 Structure

4.13 Level 2G Land Surface Reflection/Fire (PGE13)

PGE13 performs the daily L2G Land Surface Reflectance/Fire processing at MODAPS

Purpose

PGE13 produces the L2G Land Surface Reflectance products (MOD09GHK, MOD09GQK, and MOD09GST) and the L2G Thermal Anomalies/Fire product (MOD14GD and MOD14GN in day and night mode, respectively). It also produces the Land QA product (MODLM_QA) and the subsetted products (MOD_SS).

Structure

PGE13 consists of the L2G Land Surface Reflectance/Fire process (MOD_PRMGR) and the Land QA process (MOD_PRLQA). MOD_PRMGR is a general purpose process which will generate L2G Land products, including the surface reflectance and thermal anomalies. PGE13 also runs the Land shared MOD_PRSS.pl script to produce the subsetted products.

MODAPS Production

PGE13 runs in MODAPS Recipe AM1M_L5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. Currently MODAPS runs two PGE 13 profiles to produce the day mode daily Surface Reflectance and Thermal Anomalies/Fire products and the night mode daily Thermal Anomalies/Fire product. Products currently archived at MODAPS are the daily L2G MOD09GHK, MOD09GST, MOD09GQK, MOD14GD, and MOD14GN. MODAPS exports all of these products to the PDR Server for archive and distribution at the LP DAAC. MODAPS Interim products are 4 granules of MODLM_QA for day mode, 1 granule of MODLM_QA for night mode, and the MOD_SS subsetted products.

Production Rules

PGE13 processes the Land Surface Reflectance at 250 m, 500 m, and 1 km resolutions and the Thermal Anomalies/Fire at 1 km resolution. All of the Land Surface Reflectance products are produced only in day mode. The L2G Thermal Anomalies product is produced separately in day mode and night mode.

For the MODIS SDPS, tile schemes in the Sinusoidal Projection have been defined and registered in MODAPS. These tile schemes are listed in Table 3-8 with the MODIS Recipes that use them. If disk resources are insufficient, MODAPS has tile schemes that process high-priority tile regions from North America, South America, Africa, and Asia. Since all products can be made during the same PGE run, MODAPS requires only two profiles, the day mode and night mode. Table 3-9 lists the L2G PGE profiles that use these tile schemes, the recipes, the input and output products, the controlling runtime parameter and values, and other relevant information. The PGE13 profiles are identified by two types of input. First, the profile is identified by a static runtime parameter (L_PRODUCT) in the PCF. Table 3-9 shows the values of the L_PRODUCT

associated with each PGE profile. Second, a metadata query on the DayNightFlag distinguishes the day and night products. Using the Metadata Based Query Production Rule, a selection of granules of MOD09 and MOD14 with DayNightFlag set to either “Day” or “Both” will be made for PGE13 profiles at registration to generate all daytime surface reflectance products and daytime thermal anomalies products. A selection of granules with DayNightFlag set to “Night” will be made for PGE13 profiles to generate the nighttime thermal anomalies products.

Out of the total number of Land tiles over the surface of the Earth defined in the Sinusoidal projection, PGE13 generates surface reflectance products for 294 tiles. Each PGE13 profile runs once per tile per day after the L2G Pointer (PGE12) has completed. The Period Specification Production Rule is used to activate PGE13. The operational scenario is a maximum of 294 activations per day for each PGE13 profile, representing the processing of one tile of land surface reflectance or thermal anomalies per PGE execution. The Land QA Process MOD_PRLQA is run when MOD_PRMGR has completed. MOD_PRSS then makes the subsetting products.

PGE13 requires the Latitude/Longitude Tiling Production Rule. To execute PGE13, a Latitude/Longitude tile definition file must be associated with the PGE during registration at MODAPS. The MODAPS Loader for PGE13 selects the tiles to be processed. For each individual execution, MODAPS will create an instantiation of PGE13 with a particular TileID and Tile mode and pass these back to the PGE as Runtime Parameters. The current version of PGE13 determines the TileID from the filename rather than the runtime parameter.

The required inputs for PGE13 profile are matching granules of the surface reflectance (MOD09) or of the thermal anomalies (MOD14) and the pointers (MODPT1KD, MODPT1KN, MODPTHKM, and MODPTQKM) at the resolution identified in Table 3-9. The number of granules overlapping a particular tile for a daily PGE run may be as few as one or even zero. If there are zero granules, the PGE is not run for that tile. For all L2G PGEs requiring the Latitude/Longitude Tiling Production Rule, the Minimum Number of Granules will be set to a default of one.

The Production Rules for PGE13 are:

- Period Specification,
- Latitude/Longitude Tiling,
- Minimum Number of Granules (default set to 1),
- Runtime Parameters,
- Metadata Based Query.

Data Files

Dynamic Product Input ESDT

MOD09	MODIS/Terra Land Surface Reflectance 5-Min L2 Swath 250m, 500m and 1km (R) 1
MOD14	MODIS/Terra Thermal Anomalies/Fire 5-Min L2 Swath 1km (R) 1

MODPT1KD	MODIS/Terra Observation Pointers Daily L2G Global 1km SIN Grid Day (R) 1
MODPT1KN	MODIS/Terra Observation Pointers Daily L2G Global 1km SIN Grid Night (R) 1
MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m SIN Grid (R) 1
MODPTQKM	MODIS/Terra Observation Pointers Daily L2G Global 250m SIN Grid (O) 0

Dynamic Product Output ESDT

MOD09GHK	MODIS/Terra Surface Reflectance Daily L2G Global 500m SIN Grid (A _M) (A _D) 1
MOD09GQK	MODIS/Terra Surface Reflectance Daily L2G Global 250m SIN Grid (A _M) (A _D) 1
MOD09GST	MODIS/Terra Surface Reflectance Quality Daily L2G Global 1km SIN Grid (A _M) (A _D) 1
MOD14GD	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km SIN Grid Day (A _M) (A _D) 1
MOD14GN	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km SIN Grid Night (A _M) (A _D) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Surface Reflectance Daily L2G Global 500m SIN Grid (File name contains "MOD_SS.MOD09GHK" to identify the particular subsetting product.) (I _M) 1+
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Surface Reflectance Daily L2G Global 250m SIN Grid (File name contains "MOD_SS.MOD09GQK" to identify the particular subsetting product.) (I _M) 1+
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Surface Reflectance Daily L2G Global 1km SIN Grid (File name contains "MOD_SS.MOD09GST" to identify the particular subsetting product.) (I _M) 1+
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km SIN Grid Day (File name contains

	“MOD_SS.MOD14GD” to identify the particular subsetting product.) (I _M) 1*
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km SIN Grid Night (File name contains “MOD_SS.MOD14GN” to identify the particular subsetting product.) (I _M) 1*

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 5*
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* Maximum number of 5 per run

+One file produced per validation site; maximum of 15 sites allowed.

Dynamic Runtime Parameters for Operations

TileSchemeID	<Set of tiles to be produced>
TILEID	<Tile identification number (value = 8 digit integer that specifies the specific tile within the current requested tile scheme)>
TILEMODE	<Setting for generation of tiles produced in daytime or nighttime (Day = DayNightFlag setting of “Day” or “Both”; Night = DayNightFlag setting of “Night”)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script>

Static Runtime Parameters for Operations

L_PRODUCT	<Type of products to generate: t=item state, r=reflectance 250 m, R=reflectance 500 m, F=fire day, f=fire night (Values for operations: day mode = trRF, night mode = f)>
EXACTMATCH	<Requirement for exact match between number of L2 granules and those geolocation files identified as overlap files in the pointer process. Y = Yes, N = No (Value for operations for the 4 inputs in day mode = “NNNN”; Value for operations for the 1 input in nightmode = “N”)>
L2GFORMAT	<Mode for L2G product output format (Value for operations = “compact”)>
PGE13 Version	<Version of PGE13 that appears in the ciList delivered with the code>
REPROCESSINGACTUAL metadata field	“reprocessed”
REPROCESSINGPLANNED metadata field	“further update is anticipated”
mod_prss_infile_luns	<Lun numbers for products to be subsetting.>
mod_prss_outfile_luns	<Lun numbers for output subsetting products.>

4.14 Level 2G Snow Cover (PGE14)

PGE14 is the daily L2G Snow Cover process executed at MODAPS.

Purpose

PGE14 produces L2G Snow Cover product (MOD10L2G), the Land QA product (MODLM_QA), and the subsetted product (MOD_SS).

Structure

PGE14 consists of the daily L2G Snow Cover process (MOD_PRMGR) process and the Land QA process (MOD_PRLQA). MOD_PRMGR is a general purpose process which will generate L2G Land products including Snow Cover. PGE14 also runs the Land shared MOD_PRSS.pl script to produce the subsetted products.

MODAPS Production

PGE14 runs in MODAPS Recipe AM1M_L5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE14 for each of the Land tiles configured in the data processing system upon the availability of the MOD10_L2 granules for the day and after PGE12 has generated the MODPTHKM pointer files. Products currently archived at MODAPS are the daily, tiled granules of MOD10L2G. MODAPS Interim product are granules of MODLM_QA and granules of the MOD_SS subsetted product. No products from PGE14 are currently archived at any of the DAACs.

Production Rules

PGE14 runs once per tile per day after L2G Pointers (PGE12) has completed. Since the input MOD10_L2 data for PGE14 is made only in day mode, the output MOD10L2G will be only in day mode. All input data granules retrieved for the PGE run will have the DayNightFlag set to "Day" or "Both". Out of the total number of Land tiles over the surface of the Earth defined in the Sinusoidal projection, PGE14 generates 317 tiles for the Snow Cover product. The operational scenario is nominally 317 activations per day, representing the processing of one tile of Snow Cover per PGE execution.

PGE14 requires the Latitude/Longitude Tiling Production Rule. To execute PGE14, a Latitude/Longitude tile definition file must be associated with the PGE. The tile definitions are stored as tile schemes for use by the PGEs. These tile schemes are listed in Table 3-8 with the MODIS Recipes that use them. Table 3-9 lists the L2G PGE profiles that use these tile schemes, the recipes, the input and output products, the controlling runtime parameter and values, and other relevant information. The MODAPS Loader for PGE14 selects the tiles to be processed. For each individual execution, MODAPS will create a recipe instance with a particular TileID and pass the TileID back to the PGE as a Runtime Parameter. The current version of PGE14 determines the TileID from the file names rather than the runtime parameter.

The required inputs for PGE14 are matching granules of MOD10_L2 and MODPTHKM. Using the Metadata Based Query Production Rule, the input granules of MODPTHKM are selected for either “Day” or “Both” values of the DayNightFlag. No Metadata Query is needed for the MOD10_L2 since it is only produced in day mode. The number of granules overlapping a particular tile for a daily PGE run may be as few as one or even zero. If there are zero granules, the PGE is not run for that tile. Thus, for ESDTs input to L2G PGEs requiring the Latitude/Longitude Tiling Production Rule, the Minimum Number of Granules is always set to one.

The Production Rules for PGE14 are:

- Period Specification,
- Latitude/Longitude Tiling,
- Metadata Based Query,
- Minimum Number of Granules (defaulted to 1),
- Runtime Parameters.

Data Files

Dynamic Product Input ESDT

MOD10_L2	MODIS/Terra Snow Cover 5-Min L2 Swath 500m (R) 1
MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m SIN Grid (R) 1

Dynamic Product Output ESDT

MOD10L2G	MODIS/Terra Snow Cover Daily L2G Global 500m SIN Grid (A _M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Snow Cover Daily L2G Global 500m SIN Grid (File name contains “MOD_SS.MOD10L2G” to identify the particular subsetted product.) (I _M) 1 ⁺

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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⁺One file produced per validation site; maximum of 15 sites allowed.

Dynamic Runtime Parameters

TileSchemeID	<Set of tiles to be produced>
TileID	<Tile identification number (value = 8 digit integer that specifies tile within the current requested tile scheme)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

L_PRODUCT	<Type of product to generate. Value for Operations: = S>
EXACT MATCH	<Requirement for exact match of pixel and grid intersection. Value for operations = N>
L2G FORMAT	<Mode for L2G product output format. Value for operations = compact>
PGE14 Version	<Version of PGE14 that appears in the ciList delivered with the code>
REPROCESSINGACTUAL metadata field	"reprocessed"
REPROCESSINGPLANNED metadata field	"further update is anticipated"
mod_prss_infile_luns	<Lun numbers for products to be subsetted.>
mod_prss_outfile_luns	<Lun numbers for output subsetted products.>

4.15 Level 2G Sea Ice Extent (PGE15)

PGE15 is the daily L2G Sea Ice Extent process executed at MODAPS.

Purpose

PGE15 produces the L2G daily Sea Ice Extent product (MOD29PGD and MOD29PGN) in day and night modes, respectively, and the Land QA product (MODLM_QA).

Structure

PGE15 consists of the daily L2G Sea Ice Extent process (MOD_PRMGR) and the Land QA process (MOD_PRLQA). MOD_PRMGR is a general-purpose process that will generate L2G Land products, including the Sea Ice Extent.

MODAPS Production

PGE15 runs in MODAPS Recipe AM1M_L5P, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE15 for each of the Land tiles configured in the data processing system upon the availability of the MOD29 granules for the day and after PGE12 has generated the MODPTPGD and MODPTPGN pointer files. Products currently archived at MODAPS are the daily, tiled granules of MOD29PGD and MOD29PGN. MODAPS Interim products are granules of MODLM_QA. No products from PGE15 are currently archived at any of the DAACs.

Production Rules

Currently MODAPS is producing the polar EASE-Grid products and the production scenario will only be discussed for the polar product. However PGE15 still retains the capability of producing the Sinusoidal and Integerized Sinusoidal Grid products.

PGE15 runs once per tile per day, after L2G Pointers (PGE12) has completed. Day mode (MOD29PGD) and night mode (MOD29PGN) data are produced in separate PGE runs. PGE15 will require separate, PGE profiles, one for data granules with the DayNightFlag set to "Day" or "Both" and one for data granules with the DayNightFlag set to "Night." Out of the total numbers of EASE Grid tiles defined over the surface of the Earth, PGE15 generates 210 tiles for the Sea Ice product. The operational scenario is nominally 210 activations per day for day mode and 210 activations per day for night mode, representing the processing of one Sea Ice tile per PGE execution.

PGE15 requires the Latitude/Longitude Tiling Production Rule. To execute PGE15, a Latitude/Longitude tile definition file must be associated with the PGE at registration in MODAPS. The tile definitions are stored as tile schemes to be used by the PGEs. The MODAPS Loader for PGE15 selects the tiles to be processed. For each individual PGE execution, MODAPS will create a recipe instance with a particular TileID and pass this TileID as a Runtime Parameter for the PGE. The tile schemes used by PGE15 are shown in Table 3-8. Since MOD29PGD and MOD29PGN are produced in separate runs for day and night modes, MODAPS requires two profiles, one for day mode and one for night mode. Table 3-9 lists the L2G PGE profiles that use these tile schemes,

the recipes, the input and output products, the controlling runtime parameter and values, and other relevant information.

The required inputs for PGE15 are matching granules of MOD29 and MODPTPGD or MODPTPGN. Using the Metadata Based Query Production Rule, a query is performed on the DayNightFlag in MOD29 to retrieve the granules for the day mode PGE profiles and the night mode PGE profiles. Either MODPTPGD or MODPTPGN is staged for the PGE run. At the PGE installation the value for the day mode is set to “Day” or “Both” and for the night mode is set to “Night.” The number of granules overlapping a particular tile for a daily PGE run may be as few as one or even zero. If there are zero granules, the PGE is not run for that tile. Thus, for ESDTs input to L2G PGEs requiring the Latitude/Longitude Tiling Production Rule, the Minimum Number of Granules is set to one as a default.

The Production Rules for PGE15 are:

- Period Specification,
- Latitude/Longitude Tiling,
- Metadata Based Query,
- Minimum Number of Granules (defaulted to 1),
- Runtime Parameters.

Data Files

Dynamic Product Input ESDT

MOD29	MODIS/Terra Sea Ice Extent 5-min L2 Swath 1km (R) 1
MODPTPGD	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Day (R) 1
MODPTPGN	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Night (R) 1
MODPT1KD	MODIS/Terra Observation Pointers Daily L2G Global 1km SIN Grid Day (Alternate Sinusoidal grid product) (R) 1
MODPT1KN	MODIS/Terra Observation Pointers Daily L2G Global 1km SIN Grid Night (Alternate Sinusoidal grid product) (R) 1

Dynamic Product Output ESDT

MOD29PGD	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Day (A_M) 1
MOD29PGN	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Night (A_M) 1

MOD29GD	MODIS/Terra Sea Ice Extent Daily L2G Global 1km ISIN Grid Day (Alternate Sinusoidal grid product) (A _M) 1
MOD29GN	MODIS/Terra Sea Ice Extent Daily L2G Global 1km ISIN Grid Night (Alternate Sinusoidal grid product) (A _M) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

TileSchemeID	<Set of tiles to be produced>
TileID	<Tile identification number (value = 8 digit integer that specifies a specific tile within the current requested tile scheme)>
TILEMODE	<Setting for generation of tiles produced in daytime or nighttime. (Day= DayNightFlag Setting of “Day” or “Both”; Night = DayNightFlag Setting of “Night”)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

L_PRODUCT	<Type of product to generate. Value for Operations: l = Sea Ice Day Mode, i = Sea Ice Night Mode>
EXACT MATCH	<Requirement for exact match of pixel and grid intersection (value for operations = N)>
L2GFORMAT	<Mode for L2G product output format (value for operations = compact)>
PGE15 Version	<Version of PGE15 that appears in the ciList delivered with the code>
REPROCESSINGACTUAL metadata field	“reprocessed”
REPROCESSINGPLANNED metadata field	“further update is anticipated”

4.16 Level 2/Level 3 Land Surface Temperature (PGE16)

PGE16 is the daily L2 and L3 Land Surface Temperature (LST) processing executed at MODAPS.

Purpose

PGE16 produces the L2 granule LST/Emissivity product (MOD11_L2) and the L3 tiled Gridded Daily LST/Emissivity products (MOD11A1 and MOD11B1) at 1km and 5km resolutions, respectively. The tiled products are updated by multiple process runs within PGE16. It also produces the Land QA product (MODLM_QA), the subsetted products (MOD_SS), and BROWSE products.

Structure

PGE16 consists of the L2 granule and L3 gridded LST/Emissivity processes (MOD_PR11A1 and MOD_PR11B1) and the Land QA process (MOD_PRLQA). PGE16 also runs the Land shared MOD_PRSS.pl script to produce the subsetted products and runs BROWSE (MOD_PRbrowse).

MODAPS Production

PGE16 runs in MODAPS Recipe AM1M_L4, which is executed every day upon the availability of matching sets of MOD021KM, MOD07_L2, MOD03, and MOD35_L2 granules covering the daily processing period. The previous yearly Land Cover Type (MOD12Q1) tiles are also required as input. MOD10_L2 and the previous 16-day MOD43B1C are optional inputs. The output products are 5-minute swaths of MOD11_L2, daily tiles of MOD11A1, daily tiles of MOD11B1, update tiles of MOD11UPD, subsetted products, and BROWSE products.

PGE16 processing is more complex than most PGEs because swaths of L2 products and daily tiled L3 products are produced by the same PGE. PGE16 has been separated into two parts. Recipe AM1M_L4 now runs MOD_PR11A1 and Recipe AM1M_L4d now runs MOD_PR11B1.

MODAPS currently divides the production into six geographical zones of 30 degrees latitude each. Under this scenario, consecutive zones must be run at non-overlapping processing times to avoid writing data into the same tiled output files simultaneously. Thus MODAPS runs alternating sets of three zones each at a time. MODAPS executes MOD_PR11A1 in Recipe AM1M_L4 once for each set of Level 2 input granules. The primary products are the 5-minute swaths of MOD11_L2 and the 1km L3 LST tiled product of MOD11A1. Other products are intermediate tiles of MOD11B1 and update tiles of MOD11UPD.

After the first process has completed for the day, MODAPS runs MOD_PR11B1 in the second part of the Recipe, called AM1M_L4d by MODAPS, to do the processing of the 5km L3 LST Land tiled product of MOD11B1. Inputs to MOD_PR11B1 are the intermediate tiles of MOD11B1 and update tiles of MOD11UPD. These MOD11UPD files are updated by MOD_PR11B1 and must be kept in MODAPS for later daily PGE16 processes.

For the MODIS Land Collection 4 Reprocessing, MODAPS Production has been enhanced for performance. MODAPS is now able to run PGE16 for odd and even days simultaneously. This change requires two update files, MOD11UPD.A2-1 for odd days and MOD11UPD.A2-2 for even days. MODAPS also changed the zone boundaries so that the number of files to be processed will be more evenly distributed among the zones. The new boundaries are listed under Production Rules.

Products archived at MODAPS are 5-minute granules of MOD11_L2 and tiled granules of MOD11A1 and MOD11B1. The update files of MOD11UPD, granules of MODLM_QA, and MOD-SS are MODAPS Interim products. MODAPS exports MOD11_L2, MOD11A1, and MOD11B1 to the PDR Server for archive and distribution at the LP DAAC. PGE16 also produces BROWSE products and exports them to the LP DAAC.

Production Rules

The Period Specification Production Rule is required for the daily processing. The required inputs are matching granules of MOD021KM, MOD03, MOD07_L2, MOD35_L2, and MOD12Q1; MOD10_L2 and the previous 16-day MOD43B1C are optional inputs to be staged if they are available. There will be a specified wait time and Minimum Number of Granules for each required input data type, after which PGE16 will run if the minimum requirements are met.

The volume of input data for the daily run of PGE16 is very large. Since only seven bands of the L1B MOD021KM are required for PGE16, subsetting of these granules can be performed dynamically when the PGE is run. The subsetted product would be staged and used in processing. However, PGE16 was run without the subsetting at launch.

The MODAPS operational scenario is one activation of the AM1M_L4 recipe that runs the MOD_PR11A1 process in PGE16 for each L2 granule every day, representing the processing of up to 288 MOD11_L2 granules per day. MOD_PR11A1 also produces the 1km daily LST tiles of MOD11A1, intermediate tiles of MOD11B1, and update tiles of MOD11UPD. MOD_PR11A1 uses the generalized split-window LST algorithm. MODAPS runs MOD-PR11A1 separately on 6 zones, each covering 30 degrees in latitude. For the 6-zone scheme, MODAPS stages granules and tiles that fall into one of 6 zones and executes AM1M_L4 for each zone. However, only non-adjacent zones can be run at the same time in order to avoid processing multiple input granule sets that might cause the writing of L3 data into the same tiles simultaneously. Thus, zones 1, 3, and 5 are run simultaneously. When these zones are complete, zones 2, 4, and 6 are run. The MOD11A1 archived product and MOD11UPD update files are produced for all 317 Land tiles.

When the first process has completed for the day, MODAPS runs the second process MOD_PR11B1 of PGE16 in Recipe AM1M_L4d by tiles. MOD_PR11B1 uses the day/night LST algorithm. MOD_PR11B1 inputs the intermediate MOD11B1 and MOD11UPD, produces the 5km daily LST tiles of MOD11B1, and updates MOD11UPD.

Out of the total number of Land tiles over the surface of the Earth defined in the Sinusoidal projection, PGE16 generates L3 Land Surface Temperature products for 317 tiles. There are nominally 317 executions of the second part of PGE16 per day to make the L3 tiled products. All of the tiled products, MOD11A1, MOD11B1, and MOD11UPD, must be kept in the staging area for PGE16 until all of the granules for the day have been processed. These tiled products are input to subsequent PGE16 runs and are updated throughout the day.

Successful execution of PGE16 each day depends on the sorting and matching of the various types of input products and the output products. PGE16 should not be executed within the script for any 5-minute granule period unless all of the required input files are available. The script should skip granule sets that are not complete. The MODAPS script sorts and matches all Level 2 input granules according to the order of the MOD021KM L1B granules in the PCF and sets the output MOD11_L2 granules in the same order in the PCF. The MODAPS script also sorts and matches all output MOD11UPD update files, output MOD11A1 tiles, and output MOD11B1 tiles in the PCF according to the order of the MOD12Q1 input tiled files in the PCF. The script controls the sorting and processing of one set of matching granules of the required inputs at a time to prevent simultaneous writing to the same file.

The LST swath granules of MOD11_L2 will be completed at each execution of process MOD_PR11A1. The 1km LST L3 tiles of MOD11A1 may be updated each time MOD_PR11A1 is executed. The 1km LST L3 tiles of MOD11A1 are completed at the final run of MOD_PR11A1 for the day. The 5km LST L3 tiles of MOD11B1 are completed at the final run of MOD_PR11B1 for the day. PGE16 will generate one granule of gridded LST MOD11A1 and MOD11B1 for each tile containing data for the day. Interim update files of MOD11UPD containing data to go into the tiled products will be produced during the PGE run. All MOD11UPD files must be kept in the MODAPS production system for later daily PGE16 processing. At the end of the second process in PGE16, the L3 tiled LST products at 1km and 5km resolutions will be ready for archiving. PGE16 also produces the MODLM_QA files and the MOD_SS subsetting products for MOD11_L2, MOD11A1, MOD03, MOD021KM, and MOD35_L2. It also produces BROWSE products.

For the MODIS Land Collection 4 Reprocessing, MODAPS was enhanced for performance. MODAPS is now able to run odd and even days simultaneously. Two sets of update files of MOD11UPD are produced each day, MOD11UPD.A2-1 for odd days and MOD11UPD.A2-2 for even days.

The zone boundaries were changed to distribute the number of files processed more evenly. The new zones are the following:

Degrees North	90 – 70 – N1	Degrees South	10 – 20 – S1
	70 – 40 – N2		20 - 50 – S2
	40 – 10 – N3		50 – 90 – S3

During much of the first year of the Terra Mission the dynamic 96-day Land Cover Type MOD12Q1 products were not available. Static land cover files in MOD11LCU were used instead. The Land Cover Group at the University of Maryland (UMD) prepared static Land Cover Type files in the same format as MOD12Q1. These files were installed at MODAPS in the MOD12Q1 collection for use by PGEs until the MOD12Q1 products could be generated by PGE41. When UMD started generating the MOD12Q1 tiles, MODAPS replaced the static files with the dynamic MOD12Q1. For the MODIS Land Collection 4 Reprocessing, MOD12Q1 was changed from a 96-day to a yearly product. PGE16 will use the Advanced Temporal Production Rule to acquire the previous MOD12Q1 granule by setting a delta time from the beginning of the processing period for PGE16.

PGE16 has a unique static runtime parameter switch to either use the standard MOD021KM L1B granules as input or subsetting L1B granules that contain data from only the MODIS bands needed by PGE16. This runtime parameter, SUBSET_1B, is set to 0 for the standard product and to 1 for the subsetting product. For the current MODAPS operations the SUBSET_1B is set to 0.

PGE16 has several other PGE-specific static runtime parameters. Parameter N_READ_LINES defines the number of scan lines of the input granule to be read at one time. It should have a value that is a multiple of 10s and can evenly divide the total number of scan lines. The default for operations is 10. Parameter IGNORE_UNCERT acts as a switch for the PGE to ignore or accept granules of L1B with the uncertainty flag set for bad quality value. Parameter TURN_OFF_CALIBRATION_CORRECTION is set to either correct the calibration or not. Parameter IS_A_SIDE_DATA will be set when the errors in bands 31 and 32 in MOD11_L2 are removed from the L1B data.

The Production Rules for PGE16 are:

- Period Specification,
- Advanced Temporal,
- Zonal Tiling,
- Minimum Number of Granules,
- File Update.

Data Files

Static Input ESDT

MOD11LUW	MODIS/Terra Land Surface Temperature Split Window LUT for Production of MOD11 Products
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Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 288*
MOD07_L2	MODIS/Terra Temperature and Water Vapor Profiles 5-Min L2 Swath 5km (R) 288*

MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 288*
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250 and 1km (R) 1
MOD10_L2	MODIS/Terra Snow Cover 5-Min L2 Swath 500m (O) 288*
MOD12Q1	MODIS/Terra Land Cover Type Yearly L3 Global 1km SIN Grid (Previous yearly tiles that are updated quarterly) (R) 317*
MOD43B1C	MODIS/Terra Coarse BRDF/Albedo Model-1 16-Day L3 Global 5km SIN Grid (Previous 16-day tiles) (O) 317*

Dynamic Product Output ESDT

MOD11_L2	MODIS/Terra Land Surface Temperature/Emissivity 5-Min L2 Swath 1km (A _M) (A _D) 288*
MOD11A1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 1km SIN Grid (A _M) (A _D) 317*
MOD11B1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 5km SIN Grid (A _M) (A _D) 317*
MOD11UPD	MODIS/Terra Land Surface Temperature Update Files L3 Global 1km SIN Grid (I _M) 317*
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Land Surface Temperature/Emissivity 5-Min L2 Swath 1km (File name contains "MOD_SS.MOD11_L2" to identify the particular subsetting product.) (I _M) 1+
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 1km SIN Grid (File name contains "MOD_SS.MOD11A1" to identify the particular subsetting product.) (I _M) 1+
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (File name contains "MOD_SS.MOD03" to identify the particular subsetting product.) (I _M) 1+
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Calibrated Radiances 5-Min L1B Swath

	1km (File name contains "MOD_SS.MOD021KM" to identify the particular subsetted product.) (I _M) 1 ⁺
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250 and 1km (File name contains "MOD_SS.MOD35_L2" to identify the particular subsetted product.) (I _M) 1 ⁺
BROWSE	MODIS/Terra Browse Products (A _M) (A _D) 2

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1266*
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*Maximum per day

*One file produced per validation site; maximum of 15 sites allowed.

Dynamic Runtime Parameters for Operations

TileSchemeID	<Set of tiles to be produced>
TileID	<Tile identification number (value = 8 digit integer that specifies tile within the current requested tile scheme)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

SUBSET_1B	<Switch to use either standard MOD021KM L1B granules as input or subsetted L1B granules (value for operations = 0, PGE16 will not use subsetted L1B product as input)>
N_READ_LINES	<Number of scan lines of input granules to be read at one time. (Value for operations = 10, read 10 scan lines at the same time for processing)>
IGNORE_UNCERT	<Switch to ignore or accept the L1B uncertainty flag for data quality (value for operations = 0, which means do not ignore this flag)>
TURN_OFF_CALIBRATION_CORRECTION	<Switch to turn-off calibration correction. (Value for operations = 0)>
IS_A_SIDE_DATA	<This runtime parameter will be set when the errors in bands 31 and 32 on the MOD11_L2 product are removed from the L1B data in the future. (Value for operations = 0)>
ReprocessingActual	"reprocessed"
ReprocessingPlanned	"further update is anticipated"
PGE16 Version	<Version of PGE16 that appears in the ciList delivered with the code>

4.17 Oceans Ancillary Meteorological Preprocess (PGE17)

PGE17 performs the Oceans ancillary meteorological preprocessing at MODAPS.

Purpose

PGE17 produces the preprocessed NMC ancillary data (MODOCNMC) for MODIS oceans processing. It re-grids 1-Degree NCEP GDAS data and converts the data from GRIB to HDF format.

Structure

PGE17 consists of the 1 degree global NCEP GDAS ancillary data preprocessor (MOD_PRNMC).

MODAPS Production

PGE17 runs in MODAPS Recipe AM1M_O0a upon arrival and ingest of a GDAS_0ZF file from the GES DAAC. A corresponding 6-hour granule of MODOCNMC is generated from each execution of the PGE and is archived at MODAPS. MODAPS exports these products to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

PGE17 runs once for each 1 Degree NCEP GDAS (GDAS_0ZF) ancillary data file and is activated 4 times per day whenever the six-hour ancillary file is available.

The Production Rule for PGE17 is:

- Basic Temporal.

Data Files

Dynamic Ancillary Product Input ESDT

GDAS_0ZF	NCEP GDAS GRIB Format 6-Hr L3 Global 1Deg (R) 1
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Dynamic Ancillary Product Output ESDT

MODOCNMC	MODIS Preprocessed NMC Ancillary Data for Ocean Processes 6-Hr L3 Global 1Deg (Preprocessed National Meteorological Center (NMC) 1 Degree NCEP GDAS (GDAS_0ZF) for MODIS Oceans Processing; converted from GRIB to HDF-EOS Format.) (A _M) (A _D) 1
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Dynamic Runtime Parameters for Operations

ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>
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Static Runtime Parameters for Operations

PGEVersion

<Version of PGE17 that appears in ciList delivered
with the code>

4.18 Oceans Ancillary Reynolds Sea Surface Temperature Preprocess (PGE18)

PGE18 performs the Oceans Ancillary Reynolds Sea Surface Temperature (SST) preprocessing at MODAPS.

Purpose

PGE18 produces the preprocessed Reynolds SST ancillary data (MODOCREY) for MODIS oceans processing. It converts the Reynolds SST data from binary to HDF format.

Structure

PGE18 consists of the Reynolds SST ancillary data preprocessor (MOD_PRREY).

MODAPS Production

PGE18 runs in MODAPS Recipe AM1M_O0c upon arrival and ingest of a REYNSST file from the GES DAAC. A corresponding 7-day granule of MODOCREY is generated from each execution of the PGE and is archived at MODAPS. MODAPS exports MODOCREY to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

PGE18 runs once for each Reynolds SST (REYNSST) ancillary data file and is activated once per week whenever the weekly file is available.

The Production Rule for PGE18 is:

Basic Temporal

Data Files

Dynamic Ancillary Product Input ESDT

REYNSST	NCEP AVHRR Reynolds Sea Surface Temperature Binary Weekly L3 Global 1Deg Lat/Lon (R) 1
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Dynamic Ancillary Product Output ESDT

MODOCREY	MODIS Preprocessed REYNSST Ancillary Data Weekly L3 Global 1x1Deg (Converted from binary to HDF-EOS Format for Oceans Processing.) (A _M) (A _D) 1
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Dynamic Runtime Parameters for Operations

ProcessingEnvironment <Computer platform on which PGE is run;
determined by the PGE perl script.>

Static Runtime Parameters for Operations

PGEVersion <Version of PGE18 that appears in ciList delivered
with the code>

4.19 Oceans Ancillary Ozone Preprocess (PGE19)

PGE19 performs the Ocean ancillary ozone preprocessing at MODAPS.

Purpose

PGE19 produces the Oceans ancillary ozone preprocessed product (MODOCOZN). It smooths the TOMS Column Ozone Earth Probe data and converts the data from ASCII to HDF format. An alternative to the preferred TOMS data is TOVS Column Ozone data.

Structure

PGE19 consists of the Oceans Ancillary Ozone Preprocessor (MOD_PROZN).

MODAPS Production

PGE19 runs in MODAPS Recipe AM1M_O0b upon the arrival and ingest of an OZONEEP file from the GES DAAC. If the OZONEEP is not available for the day, the alternative OZ_DAILY, that is also ingested from the GES DAAC, is used.

A corresponding 24-hour granule of MODOCOZN is generated from each execution of the PGE and is archived at MODAPS. MODAPS exports these products to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

PGE19 runs once per TOMS Column Ozone Earth Probe daily ancillary data file or alternatively, once per TOVS Column Ozone daily ancillary data file. PGE19 is activated one time per day whenever the daily ancillary file is available.

The Production Rule for PGE19 is:

- Basic Temporal.

Data Files

Dynamic Product Input ESDT

OZONEEP	TOMS Column Ozone (Earth Probe) Daily L3 Global 1x1.25Deg (R) 1
OZ_DAILY	NCEP TOVS Column Ozone GRIB Format Daily L3 Global 1Deg Lat/Lon (R) 1

Dynamic Product Output ESDT

MODOCOZN	MODIS Preprocessed TOMS Ozone Data for Ocean Processes Daily L3 Global 1x1.25Deg (Preprocessed TOMS Column Ozone Data for Oceans processing; converted from ASCII to HDF-EOS Format.) (A _M) (A _D) 1
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Dynamic Runtime Parameters for Operations

ProcessingEnvironment <Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

PGEVersion <Version of PGE19 that appears in ciList delivered with the code>

4.20 Level 3 Daily Oceans (PGE20)

PGE20 consists of the L3 daily Ocean process executed at MODAPS. This is the first in a series of Ocean time-binning PGEs. It is run separately for each Ocean parameter (36 Ocean Color, 3 SST, and 35 QC).

Purpose

PGE20 produces the L3 Oceans Daily products. The five types of products are 36 daily time-binned composites of Ocean Color parameters for daytime data, daily time-binned SST composites for one parameter in day mode and two parameters in night mode, 15 Ocean Color QC parameters, 20 SST QC parameters, and L3 daily maps of these products.

Structure

PGE20 consists of the Ocean L3 time-binning process (MOD_PRmtbin) which is run multiple times to perform the daily compositing of the output Ocean Color and SST products and the L3 mapping process (MOD_PRmspc and MOD_PRmmap). Figure 4-7 shows the structure of PGE20.

MODAPS Production

PGE20 runs in MODAPS Recipe AM1M_O2, which is executed daily upon the availability of all of the MODOCB_{nn} (where nn=parameters 1...36), MOD28B_{mm} (where mm=parameters D1, N1, N2), and corresponding QA products for the current Ocean Data Day being processed. Products archived at MODAPS are MODOCD_{nn} (where nn=parameters 1...36), MOD28D_{mm} (where mm=parameters D1, N1, N2), MODOQA_{qq} (where qq=parameters 51...61, 63...66), MODSQA_{rr} (where rr=parameters D1...D9, DA, N1...N9, NA), MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}D_{pp} (where pp =1...36, D1, N1, N2), and MO{04, 36}MA_{##} (where ##=parameters 41...61, 63...66, 69...78). MODAPS exports MODOQA_{qq}, MODSQA_{rr}, MO04MA_{##}, MODOCD_{nn}, MOD28D_{mm}, and MO{04,36,1D}{M,S,N,Q,F,1,2,3}D_{pp} to the PDR Server for archive and distribution at the GES DAAC. MODAPS Interim products for the same period are granules of MO36MA_{qq}. The MOD28D2 SST product that was removed from the original set of products may be produced and archived again in the future. MODAPS also produces temporary files of MODOCF_{nn} and MOD28F_{mm}, that are discarded when the PGE completes.

Production Rules

PGE20 runs when a full "Ocean Data Day" of PGE09 (MOD_PRmsbin) space-binned parameters of Ocean Color and PGE10 (MOD_PRmsbin) space-binned parameters of SST products has been produced. The Period Specification Production Rule is required for PGE20. This PGE is activated 74 times per day, once for each of the 36 Ocean Color parameters, once for each of the three MODIS Ocean SST parameters, and once for each of the QC parameters. The L3 daily composites of Ocean Color (MODOCD_{nn})

and SST (MOD28D_{mm}) are archived at MODAPS for use in subsequent Ocean processing and for export to the GES DAAC. The corresponding Temporary products (MODOCF_{nn} and MOD28F_{mm}) are deleted when the PGE run has completed. The L3 daily time-binned Ocean Color and SST QC (MODOQA_{qq} and MODSQA_{rr}) products are also archived both at MODAPS and at the GES DAAC.

PGE20 also produces various map images for each of the 39 ocean binned-product parameters and each of the 35 ocean QC parameters. The map for each ocean binned-product parameter includes eight types of values (mean, standard deviation, number of observations, quality, common flags, and three byte flags) at three resolutions, 4km, 36km, and 1 degree. The L2 Flag Byte 3 is only produced for parameters 13 through 25. The MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}D_{pp} maps are also archived at MODAPS and at the GES DAAC. MO04MA Mean maps of the QC products are archived at MODAPS and at the GES DAAC. The MO36MA Mean maps are archived at MODAPS as Interim products.

PGE20 requires the specification of the Data Day using the special Data Day implementation of the Runtime Parameters Production Rule. For this Production Rule, MODAPS stages all input granules required for an Oceans Data Day and passes the “start dataday” and “end dataday” (both equal to current/nominal day in yyyyddd format for PGE20) to the PGE as Runtime Parameters. The retrieval algorithm for an Oceans Data Day Production Rule is equivalent to using the Advanced Temporal Production Rule to retrieve granules adjacent to the nominal day and optionally using a Metadata Based Query on the start dataday and end dataday PSAs.

PGE20 also requires specification of one of the 74 input products for each execution. The parameter to be processed is indicated in a static runtime parameter, “band to map”, which is then passed into PGE20.

The Production Rules for all profiles of PGE20 are:

- Period Specification,
- Data Day,
- Runtime Parameters.

Data Files

Static Input ESDT

MODOCB	MODIS/Terra Ocean Time Binner Parameters
MODOCSPC	MODIS/Terra Ocean Space Converter Parameters
MODOCMAP	MODIS/Terra Ocean Mapper Parameters

Dynamic Product Input ESDT

One of the following for each PGE profile activation:

MODOCB _{nn}	MODIS/Terra Ocean Color Space-Binned Composite Params 1-36 5-Min L3 Global 1km ISEAG (where nn = 1-36) (R) 1*
MOD28B _{mm}	MODIS/Terra Sea Surface Temperature Space- Binned Composite Params 5-Min L3 Global 1km ISEAG (where mm = D1, N1, N2) (R) 1*
MODOQB _{qq}	MODIS/Terra Ocean Color Space-Binned Composite QC Products 5-Min L3 Global 1km ISEAG (where qq = 41-61, 63-66) (R) 1*
MODSQB _{rr}	MODIS/Terra Sea Surface Temperature Space- Binned Composite QC Products 5-Min L3 Global 1km ISEAG (where rr = D1-D9, DA, N1-N9, NA) (R) 1*

*per parameter

Dynamic Product Output ESDT

One matching set of the following for each PGE profile activation:

MODOCD _{nn}	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Daily L3 Global 4km ISEAG (where nn = parameters 1-36) (A _M) (A _D) 1*
MOD28D _{mm}	MODIS/Terra Sea Surface Temperature QC'd Params Daily L3 Global 4km ISEAG (where mm = D1, N1, N2) (A _M) (A _D) 1*
MODOQA _{qq}	MODIS/Terra Interim Composite Ocean Color QC Products Daily L3 Global 4km ISEAG (where qq = parameters 51...61, 63...66) (A _M) (A _D) 1*
MODSQA _{rr}	MODIS/Terra Interim Sea Surface Temperature QC Product Daily L3 Global 4km ISEAG (where rr = parameters D1...D9,DA,N1...N9,NA) (A _M) (A _D) 1*

*per parameter

Map Images

MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}D_{pp}

MODIS/Terra Ocean Color and SST {Mean} Maps Daily L3 Global {4km} CylEqDis

{Std. Dev.} {36km}

{Number} {1Deg}

{Quality}

{Common Flags}

{Flag Byte 1}

{Flag Byte 2}

{Flag Byte 3}

(Where:

M = MODIS

O = Oceans

{04, 36, 1D} = resolution and size:

04 = 4 km

36 = 36 km

1D = 1 Degree

{M, S, N, Q, F, 1, 2, 3} = values mapped:

M = Mean

S = Standard deviation

N = Number of observations

Q = Quality

F = Common flags

1 = L2 Flag Byte 1

2 = L2 Flag Byte 2

3 = L2 Flag Byte 3 (only produced for pp = 13 through 25)

D = Daily

pp = 1 through 36 for Ocean Color parameters or D1, N1,

and N2 for SST parameters.) (A_M) (A_D) 1*

MO04MA## MODIS/Terra Interim Ocean Color and SST QC Mean Map Daily L3 Global 4km CylEqDis (where ## = mean at 4km resolution for parameters 41...61, 63...66, 69...78) (A_M) (A_D) 1*

MO36MA## MODIS/Terra Interim Ocean Color and SST QC Mean Map Daily L3 Global 36km CylEqDis (where ## = mean at 36km resolution for parameters 41...61, 63...66, 69...78) (A_M) 1*

*per parameter

Temporary Product Output ESDT

MODOCF_{nn}

MODIS/Terra Ocean Color Temporary Composite Params 1-36 Daily L3 Global 4km ISEAG (where nn = parameters 1-36; used for temporary storage of daily products.) (T_M) 26*

MOD28F_{mm}

MODIS/Terra Sea Surface Temperature Temporary Composite Params Daily L3 Global 4km ISEAG

(where mm = D1, N1, N2; used for temporary storage
of daily products) $(T_M) \quad 26^*$

*per parameter

Dynamic Runtime Parameters for Operations

start dataday	<Start Ocean Day for Data Observations>
end dataday	<End Ocean Day for Data Observations>
ParamName	<Name of parameter to process>
band to map	<Name of parameter to map>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime parameters for Operations

SMFLOG_ SCREEN Switch	O
time flag	A
gsfc quality	1
longitude, origin	0.0
latitude, origin	0.0
projection rotation	0.0
longitude, center	0.0
latitude, center	0.0
output image width in degrees	0.0
output image height in degrees	180.0
which quality field	B
PGEVersion	<Version of PGE20 that appears in the ciList delivered with the code>

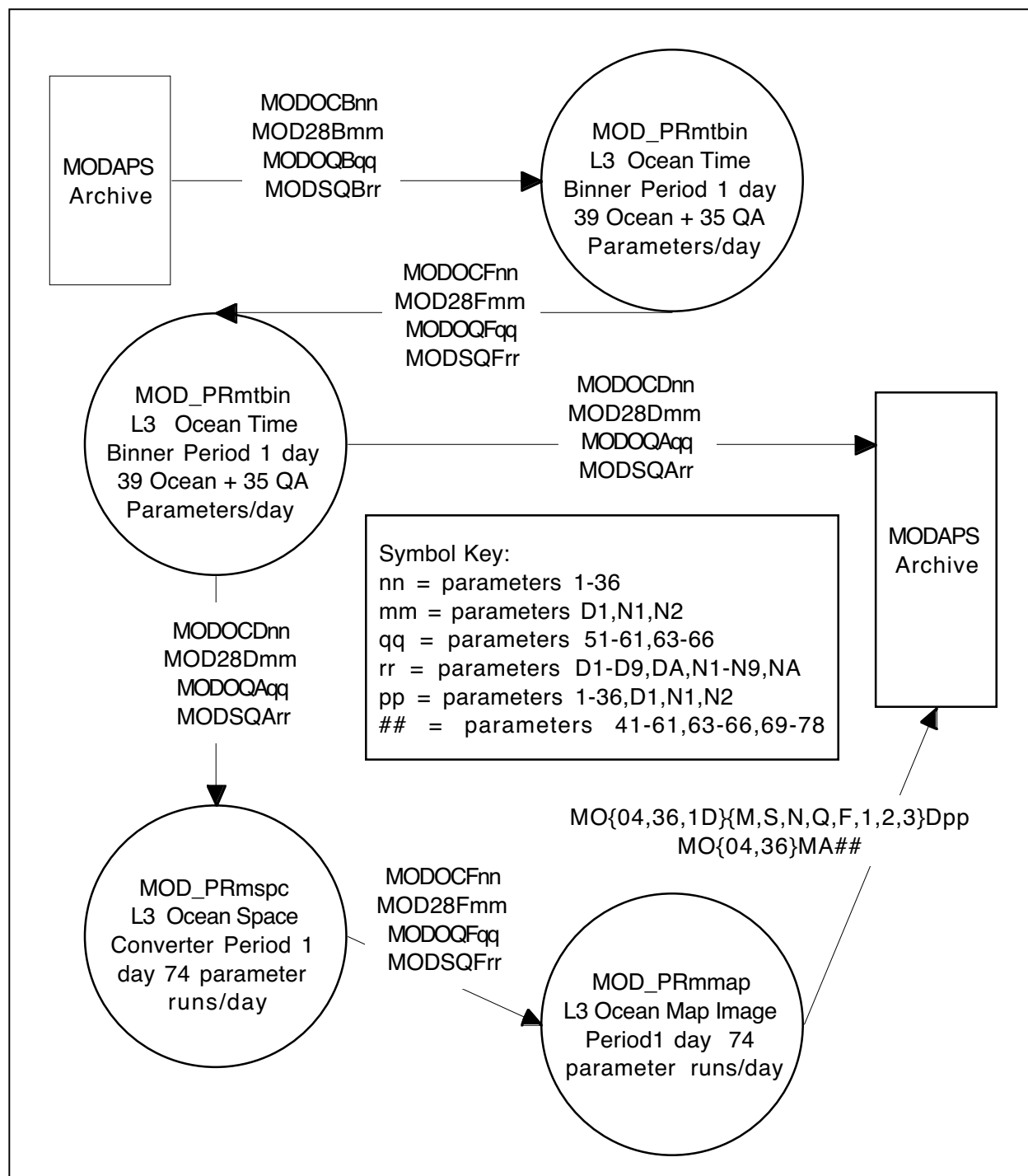


Figure 4-7 PGE20 Structure

4.21 Level 3 Land 8-Day Surface Reflectance (PGE21)

PGE21 performs the Land L3 surface reflectance processing at MODAPS.

Purpose

PGE21 produces the 8-day gridded surface reflectance products (MOD09A1, MOD09Q1), a coarse surface reflectance product (MOD09A1C) at 5km resolution, subsetted MOD09A1 and MOD09Q1 products (MOD_SS), a BROWSE product, and the Land QA product (MODLM_QA).

Structure

PGE21 consists of the L3 Land 8-Day Surface Reflectance process (MOD_PR09A) and the Land QA process (MOD_PRLQA). PGE21 also runs the Land shared MOD_PRSS.pl Script to produce the subsetted products and runs the BROWSE (MOD_PRbrowse).

MODAPS Production

PGE21 runs in MODAPS Recipe AM1M_L10, which is executed every 8 days upon the availability of the MODIS Land pointer files (MODPTHKM, MODPTQKM), geolocation angles (MODMGGAD), and the L2G Land surface reflectance products (MOD09GHK, MOD09GQK, MOD09GST) covering the 8-day processing period. MODAPS runs PGE21 for each of the Land tiles configured in the data processing system. Products currently archived at MODAPS are the 8-day tiled granules of MOD09A1, MOD09Q1, and MOD09A1C. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD09A1 and MOD09Q1 to the PDR Server for archive and distribution at the LP DAAC. PGE21 also produces a BROWSE product and exports it to the LP DAAC.

Production Rules

PGE21 runs once for each of the L2G Land tiles over a period of eight days. The Period Start of 8 Days Production Rule will be used by MODAPS to stage the daily L2G files. Out of the total number of Land tiles over the surface of the Earth defined in the Sinusoidal projection, PGE21 generates Surface Reflectance products for 294 tiles. The MODAPS Loader for PGE21 selects the tiles to be processed. The operational scenario is 294 activations every eight days, representing the processing of one Land tile per PGE run.

PGE21 requires the Latitude/Longitude Tiling Production Rule. To execute PGE21, a Latitude/Longitude tile definition file must be associated with the PGE at MODAPS. The tile definitions are stored as tile schemes for use by the PGEs. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. For each individual execution, MODAPS will create a recipe instance for a particular Tile ID and pass the information on the Tile ID back to the PGE as part of the input file names. Since PGE21 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter for use by the PGE.

However, PGE 21 has the capability of producing the 8-day Surface Reflectance product at two resolutions, 500m and 250m. The required input data sets are matching granules of MOD09GHK, MOD09GQK, MOD09GST, MODPTHKM, MODPTQKM, and MODMGGAD. The products from PGE21 depend upon its inputs. The following list relates the input products to the output products:

Input only 250m products	Produce MOD09Q1 and MOD09A1C
Input only 1km and 500m products	Produce MOD09A1 and MOD09A1C
Input 1km, 500m, and 250m products	Produce MOD09A1, MOD09Q1, and MOD09A1C

A runtime parameter is passed to PGE21 to indicate which products from PGE 21 are to be subsetting and written to the MOD_SS file. This runtime parameter contains the logical unit numbers for these products. A second runtime parameter contains the corresponding logical unit numbers for the output MOD_SS files. The version number for PGE21 is also passed into the PGE as a runtime parameter.

The L2G Land Surface Reflectance products and their required pointers are only generated in day mode. However, the DayNightFlag may have a setting of "Day" or "Both" due to a corresponding setting of the DayNightFlag to "Day" or "Both" for the input L2 MOD09 granules to PGE13. Since the DayNightFlag for the L2G Land Surface Reflectance products is never set to "Night" and a DayNightFlag setting of "Day" and "Both" for L2G inputs to PGE21 is required, no Metadata Query is required on these L2G input products. Matching sets of the daily L2G data files are required for each tile. PGE21 software will be responsible for matching daily L2G data from all of the required inputs for each day in the 8-day period. PGE21 will require a "Smart" Start of Year Production Rule at the end of each year.

The Production Rules for all of the profiles of PGE21 are:

- Period Start of 8 Days,
- "Smart" Start of Year,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD09GHK	MODIS/Terra Surface Reflectance Daily L2G Global 500m SIN Grid (R) 1
MOD09GQK	MODIS/Terra Surface Reflectance Daily L2G Global 250m SIN Grid (R) 1
MOD09GST	MODIS/Terra Surface Reflectance Quality Daily L2G Global 1km SIN Grid (R) 1

MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m SIN Grid (R) 1
MODPTQKM	MODIS/Terra Observation Pointers Daily L2G Global 250m SIN Grid (R) 1
MODMGGAD	MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid Day (R) 1

Dynamic Product Output ESDT

MOD09A1	MODIS/Terra Surface Reflectance 8-Day L3 Global 500m SIN Grid (A _M) (A _D) 1
MOD09A1C	MODIS/Terra Coarse Surface Reflectance 8-Day L3 Global 5km SIN Grid (A _M) 1
MOD09Q1	MODIS/Terra Surface Reflectance 8-Day L3 Global 250m SIN Grid (A _M) (A _D) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: Surface Reflectance 8-Day L3 Global 500m SIN Grid (File name contains "MOD_SS.MOD09A1" to identify the particular subsetted product. (I _M) 1*
MOD_SS	MODIS/Terra Land Subsetting QA Files: Surface Reflectance 8-Day L3 Global 250m SIN Grid (File name contains "MOD_SS.MOD09Q1" to identify the particular subsetted product. (I _M) 1*
BROWSE	MODIS/Terra Browse Products (A _M) (A _D) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1*
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* Maximum of 2 per run

+ One file produced per validation site; maximum of 15 sites allowed.

Dynamic Runtime Parameters for Operations

TileSchemeID	<Set of tiles to be produced>
TileID	<Tile identification number (value = 8 digit integer that specifies the specific tile within the current requested tile scheme)>
Start date time	<Start time for data observations>
End date time	<End time for data observations>

SatelliteInstrument <Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>

ProcessingEnvironment <Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Paramaters for Operations

SizeMBECSDDataGranule value	<File size in MB; value = 266>
ReprocessingPlanned value	"further update is anticipated"
ReprocessingActual value	"reprocessed"
ParameterName value	M(O,Y)DO9(A,Q)1
ParameterName value for the coarse product	M(O,Y)DO9A1C
produce coarse product 1 = yes, 0=no	1
mod_prss_infile_luns	<Lun numbers for products to be subsetted.>
mod_prss_outfile_luns	<Lun numbers for subsetted products.>
PGE21 Version	<Version of PGE21 that appears in the ciList delivered with the code>

4.22 Level 3 Daily Aggregation (PGE22)

PGE22 performs the L3 Daily Land Aggregation processing at MODAPS.

Purpose

PGE22 produces L3 Bi-directional Reflectance Distribution Function (BRDF) Preprocessing Database product (MODAGAGG) and the L3 BRDF Texture Database (MODAGTEX) at 1km resolution. It also produces the corresponding subsetted BRDF products (MOD_SS) and the Land QA product (MODLM_QA).

Structure

PGE22 consists of the L3 Aggregation process (MOD_PRAGG) and the Land QA process (MOD_PRLQA). PGE22 also runs the Land shared MOD_PRSS.pl script to produce the subsetted products.

MODAPS Production

PGE22 runs in MODAPS Recipe AM1M_L5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE22 for each of the Land tiles configured in its Data Processing System upon the availability of the L2G Surface Reflectance granules (MOD09GHK, MOD09GQK, and MOD09GST) from PGE13 and the L2G Pointers and Geolocation Angles (MODPTHKM, MODPTQKM, and MODMGGAD) from PGE12. Products archived at MODAPS are the daily MODAGAGG and MODAGTEX tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. No products from PGE22 are archived at the DAAC.

Production Rules

PGE22 runs daily for each of the Land tiles. Out of the total number of Land tiles over the surface of the Earth defined in the Sinusoidal projection, PGE22 generates 294 tiles of land aggregation products. The operational scenario is nominally 294 activations per day, representing the processing of one Land tile of MODAGAGG and MODAGTEX per PGE execution. The Period Specification Production Rule will be used to stage the daily L2G files.

PGE22 requires the Latitude/Longitude Tiling Production Rule. To execute PGE22, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. The MODAPS Loader for PGE22 selects the tiles to be processed. For each individual execution, MODAPS will create a recipe instance for a particular Tile ID. Since PGE22 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter for use by the PGE. The tiling schemes were used to produce the input products of L2G Surface Reflectance for PGE22 are shown in Table 3-9.

The required input data sets are matching granules of MOD09GHK, MOD09GQK, MOD09GST, MODPTHKM, MODPTQKM and MODMGGAD. L2G Geoangles

(MODMGGAD) are already generated separately in day mode. The L2G Land Surface Reflectance products and their required pointers are only generated in day mode. Thus, no Metadata Query is required on these input products. PGE22 software will be responsible for matching granules of L2G data from all of the required inputs for the day.

A runtime parameter is passed into PGE22 to include which products from PGE22 are to be subsetting and written to each of the MOD_SS files. This runtime parameter contains the list of logical unit numbers for these products. A second runtime parameter contains the list of corresponding logical unit numbers for the output MOD_SS files. The version number for PGE22 is also passed into the PGE as a runtime parameter.

The Production Rules for PGE22 are:

- Period Specification,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD09GHK	MODIS/Terra Surface Reflectance Daily L2G Global 500m SIN Grid (R) 1
MOD09GQK	MODIS/Terra Surface Reflectance Daily L2G Global 250m SIN Grid (R) 1
MOD09GST	MODIS/Terra Surface Reflectance Quality Daily L2G Global 1km SIN Grid (R) 1
MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m SIN Grid (R) 1
MODPTQKM	MODIS/Terra Observation Pointers Daily L2G Global 250m SIN Grid (R) 1
MODMGGAD	MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid Day (R) 1

Dynamic Product Output ESDT

MODAGAGG	MODIS/Terra BRDF Preprocessing Database Daily L3 Global 1km SIN Grid (A_M) 1
MODAGTEX	MODIS/Terra BRDF Texture Database Daily L3 Global 1km SIN Grid (A_M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: BRDF Preprocessing Database Daily L3 Global 1km SIN Grid (Filename contains MOD_SS.MODAGAGG to identify the particular subsetting product.) (I_M) 1+

MOD_SS	MODIS/Terra Land Subsetting QA Files: BRDF Texture Database Daily L3 Global 1km SIN Grid (Filename contains MOD_SS.MODAGTEX to identify the particular subsetting product.)	(I _M) 1 ⁺
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* One file produced per validation site; maximum of 15 sites allowed.

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance	(I _M) 2
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Dynamic Runtime Parameters for Operations

TileSchemeID	<Set of tiles to be produced>
TileID	<Tile identification number (value = 8 digit integer that specifies the specific tile within the current requested tile scheme)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

SizeMBECSDDataGranule value	<File size; Value = 183>
ReprocessingPlanned value	"further update is anticipated"
ReprocessingActual value	"processed"
ParameterName value	Surface_Refl
mod_prss_infile_luns	<Lun numbers for products to be subsetting.>
mod_prss_outfile_luns	<Lun numbers for subsetting products.>
PGE22 Version	<Version of PGE22 that appears in the ciList delivered with the code>
Reduced_Volume	<Flag to enable/disable volume reduction; YES = enable, NO = disable.>

4.23 Level 3 16-Day Bi-Directional Reflectance Distribution Function/ Albedo (PGE23)

PGE23 performs the L3 16-Day Di-directional Reflectance Distribution Function (BRDF)/Albedo processing at MODAPS.

Purpose

PGE23 produces BRDF, Albedo, and Adjusted Nadir Reflectance products (MOD43B1, MOD43B2, MOD43B3, and MOD43B4), the corresponding coarse (5km) products (MOD43B1C, MOD43B3C, and MOD43B4C), the Land QA product (MODLM_QA), subsetted MOD43B1, MOD43B2, MOD43B3, and MOD43B4 products (MOD_SS), and BROWSE products.

Structure

PGE23 consists of the BRDF Albedo Terra only process (MOD_PR43B), the BRDF Albedo Terra plus Aqua process (MOD_PR43BAT), and the Land QA process (MOD_PRLQA). PGE 23 also runs the Land shared MOD_PRSS.pl Script to produce the subsetted products and runs the BROWSE (MOD_PRbrowse).

MODAPS Production

PGE23 runs in MODAPS Recipe AM1M_L12, which is executed every 16 days upon the availability of all of the expected daily granules of MODAGAGG covering the 16-day processing period. MODAPS runs PGE23 for each of the Land tiles configured in the data processing system. If the AM1M_L12 plan is inserted into MODAPS, MOD_PR43B runs. Products archived at MODAPS are the 16-Day MOD43B1, MOD43B2, MOD43B3, and MOD43B4 tiled granules. MODAPS Interim products are MOD43B1C, MOD43B2C, MOD43B3C, MOD43B4C, MOD_SS and MODLM_QA. PGE23 also produces BROWSE products. MODAPS exports MOD43B1, MOD43B2, MOD43B3, and MOD43B4 to the PDR Server for archive and distribution at the LP DAAC. PGE23 also produces BROWSE products and exports them to the LP DAAC. MOD_PR43BAT runs to produce Terra and Aqua combined products. No Aqua-only products are produced.

Production Rules

PGE23 runs after 16 days of L3 Daily Aggregation (PGE22) processing has completed for a tile. Out of the total number of Land tiles over the surface of the Earth defined in the Sinusoidal projection, PGE23 generates 294 tiles of BRDF and albedo products. The operational scenario is nominally 294 activations per day, representing the processing of one Land tile of MODAGAGG and MODAGTEX per PGE execution. The operational scenario is nominally 294 activations every 16 days, representing the processing of one Land tile per PGE run. The required input data set is MODAGAGG which has been generated only in day mode. Thus, the output products are produced only in day mode. PGE 23 requires the Period Start of 16 Days Production rule to acquire the correct 16 daily BRDF database granules for the tile being processed. PGE23 will require a "Smart" Start of Year Production Rule at the end of each year.

PGE23 requires the Latitude/Longitude Tiling Production Rule. To execute PGE23, a Latitude/Longitude tile definition file must be associated with the PGE. For each individual execution, MODAPS will create a recipe instance for a particular Tile ID. Since PGE23 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter. The tiling scheme containing the tile definitions and recipe used by PGE 23 are in shown in Table 3-8.

A runtime parameter is passed into PGE23 to indicate which products from PGE23 are to be subsetted and written to each of the MOD_SS files. This runtime parameter contains the list of logical unit numbers for these products. A second runtime parameter contains the list of corresponding logical unit numbers for the output MOD_SS files. A maximum of 15 subsetted files of each ESDT are allowed, one for each validation site. The Version number for PGE23 is also passed into the PGE as a runtime parameter.

The Production Rules for PGE23 are:

- Period Start of 16 Days,
- “Smart” Start of Year,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MOD43LUA	MODIS/Terra BRDF Surface Albedo LUT for Production of MOD43B Products
MOD43LUP	MODIS/Terra BRDF Set-up Table Database and Ancillary BRDF Database for Production of MOD43 Products
MOD43LUT	MODIS/Terra BRDF Code and Model Set-up Table for Production of MOD43 Products

Dynamic Product Input ESDT

MODAGAGG	MODIS/Terra BRDF Preprocessing Database Daily L3 Global 1km SIN Grid (R) 1
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Dynamic Product Output ESDT

MOD43B1	MODIS/Terra BRDF/Albedo Model-1 16-Day L3 Global 1km SIN Grid (A_M) (A_D) 1
MOD43B1C	MODIS/Terra Coarse BRDF/Albedo Model-1 16-Day L3 Global 5km SIN Grid (I_M) 1
MOD43B2	MODIS/Terra BRDF/Albedo Model-2 16-Day L3 Global 1km SIN Grid (A_M) (A_D) 1

MOD43B2C	MODIS/Terra Coarse BRDF/Albedo Model-2 16-Day L3 Global 1km SIN Grid (I _M) 1
MOD43B3	MODIS/Terra Albedo 16-Day L3 Global 1km SIN Grid (A _M) (A _D) 1
MOD43B3C	MODIS/Terra Coarse Albedo 16-Day L3 Global 5km SIN Grid (I _M) 1
MOD43B4	MODIS/Terra Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 1km SIN Grid (A _M) (A _D) 1
MOD43B4C	MODIS/Terra Coarse Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 5km SIN Grid (I _M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: BRDF/Albedo Model-1 16-Day L3 Global 1km SIN Grid (File name contains MOD_SS.MOD43B1 to identify the particular subsetted product.) (I _M) 1 ⁺
MOD_SS	MODIS/Terra Land Subsetting QA Files: Empirical BRDF/Albedo Model-2 16-Day L3 Global 1km SIN Grid (File name contains MOD_SS.MOD43B2 to identify the particular subsetted product.) (I _M) 1 ⁺
MOD_SS	MODIS/Terra Land Subsetting QA Files: Minimal Albedo 16-Day L3 Global 1km SIN Grid (File name contains MOD_SS.MOD43B3 to identify the particular subsetted product.) (I _M) 1 ⁺
MOD_SS	MODIS/Terra Land Subsetting QA Files: Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 1km SIN Grid (File name contains MOD_SS.MOD43B4 to identify the particular subsetted product.) (I _M) 1 ⁺
BROWSE	MODIS/Terra Browse Products (A _M) (A _D) 3

⁺ One file produced per validation site; maximum of 15 sites allowed.

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 8
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

mod_prss_infile_luns	<Lun numbers for products to be subsetted.>
mod_prss_outfile_luns	<Lun numbers for subsetted products.>
PGE23 Version	<Version of PGE23 that appears in the ciList delivered with the code>
Reprocessing Planned	"further update is anticipated"
Reprocessing Actual	"reprocessed"

4.24 Level 3 16-Day Albedo CMG (PGE24)

PGE24 performs the L3 16-day CMG Albedo Processing at MODAPS.

Purpose

PGE24 produces the 16-day Albedo CMG product (MOD43C1) and the Land QA product (MODLM_QA).

Structure

PGE24 consists of the Albedo 16-day CMG process (MOD_PR43C) and the Land QA processes (MOD_PRLQA).

MODAPS Production

PGE24 runs in MODAPS Recipe AM1M_L13, which is executed every 16 days upon the availability of all of the expected Albedo tiles from PGE23 for the 16-day processing period. The product archived at MODAPS is the 16-Day MOD43C1 global CMG map. The MODAPS Interim product is MODLM_QA. MODAPS exports MOD43C1 to the PDR Server for archive and distribution at the LP DAAC. PGE24 produces the Terra and Aqua combined product in Recipe AMPM_L13. No Aqua-only products are produced.

Production Rules

PGE24 runs after all 294 of the tiles of the 16-day L3 Albedo products (PGE23) have been processed. The Period Start of 16 Days Production Rule is specified for production. PGE24 will require a “Smart” Start of Year Production Rule at the end of each year.

The required input product is MOD43B3. The Albedo 16-day input data granules were generated only in day mode. Thus, the output product MOD43C1 is produced only in day mode. The gridded MOD43C1 product is generated from all of the available 16-day MOD43B3 tiles. A Minimum Number of Granules, representing the number of 16 day tiles, is specified for each input product type and a time-out is associated for running PGE24 if the minimum requirements are met.

The Production Rules for PGE24 are:

- Period Start of 16 Days,
- “Smart” Start of Year,
- Minimum Number of Granules.

Data Files**Dynamic Product Input ESDT**

MOD43B3	MODIS/Terra Albedo 16-Day L3 Global 1km SIN Grid (R) 1
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Dynamic Product Output ESDT

MOD43C1	MODIS/Terra Albedo 16-Day L3 Global 0.05Deg CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

PGE24 Version	<Version of PGE24 that appears in the ciList delivered with the code>
Reprocessing Planned	"further update is anticipated"
Reprocessing Actual	"reprocessed"

4.25 Level 3 16-Day Vegetation Indices 250 m and 500 m (PGE 25)

PGE25 is the L3 16-day (500m and 250m) Vegetation Indices process at MODAPS.

Purpose

PGE25 produces the 16-day global Vegetation Indices 500m product (MOD13A1), the corresponding 250m product (MOD13Q1), the Land QA product (MODLM_QA), a BROWSE product, and the subsetting MOD13A1 and MOD13Q1 products (MOD_SS).

Structure

PGE25 consists of the L3 16-day Vegetation Indices (500m and 250m) process (MOD_PR13A1) and the Land QA process (MOD_PRLQA). PGE 25 also runs the Land Shared MOD_PRS.pl Script to produce the subsetting products and runs the BROWSE (MOD_PRbrowse).

MODAPS Production

PGE25 runs in MODAPS Recipe AM1M_L12, which is executed every 16 days upon the availability of all of the expected L2G daily granules of surface reflectance and corresponding pointer files and geolocation angles (MOD09GHK, MOD09GQK, MOD09GST, MODPTHKM, MODPTQKM and MODMGGAD), covering the 16-day processing period. MODAPS may run two profiles of PGE25 for each of the Land tiles configured in the data processing system to produce the products at the two resolutions separately. The first profile produces the 500m product (MOD13A1) and the second profile produces the 250m product (MOD13Q1). MODAPS may also run a profile of PGE25 to produce both the 250m and 500m products during the same execution. Different tile schemes are used by the PGE profiles. Products archived at MODAPS are granules of MOD13A1 and MOD13Q1. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD13A1 and MOD13Q1 to the PDR Server for archive and distribution at the LP DAAC. PGE25 also produces a BROWSE product and exports it to the LP DAAC.

Production Rules

PGE25 runs after 16 days of L2G Daily Land Surface Reflectance/Fire (PGE13) output has been generated. The operational scenario is nominally 286 activations per 16-days, representing the processing of one Land tile per run. The Period Start of 16 Days Production Rule is specified for production. PGE25 will require a "Smart" Start of Year Production Rule at the end of each year.

PGE25 requires the Latitude/Longitude Tiling Production Rule. To execute PGE25, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. For each individual execution, MODAPS will create a recipe instance for a particular Tile ID. Since PGE25 now obtains the TileID from the input product, MODAPS does not need to set the TileID as a dynamic runtime parameter. Two profiles of PGE25

may be run, one for the 500m processing and one for the 250m processing. An alternative PGE profile produces products at both resolutions. Different tile schemes may be associated with each profile.

The required input products MOD09GQK, MOD09GHK, MOD09GST, MODPTHKM, MODPTQKM, and MODMGGAD are only produced in day mode. MODAPS activates PGE25 if all 16 days of the L2G surface reflectance, pointers, and geoangles are available or 21 days from the availability of the first L2G inputs if one or more of the 16 days of input files are missing. The MOD_SS subsetting products are produced for the Land validation sites. A maximum of 15 different subsetting granules of each ESDT are allowed, one for each validation site.

Runtime parameters are passed to PGE25 to indicate that the MOD13A1 and MOD13Q1 products are to be subsetting and written to the MOD_SS files. These runtime parameters contain the logical unit numbers for the products. A second set of runtime parameters contains the corresponding logical unit numbers for the output MOD_SS files. The version number for PGE 25 is also passed to the PGE as a runtime parameter.

The Production Rules for PGE25 are:

- Period Start of 16 Days,
- “Smart” Start of Year,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD09GHK	MODIS/Terra Surface Reflectance Daily L2G Global 500m SIN Grid (R) 1
MOD09GQK	MODIS/Terra Surface Reflectance Daily L2G Global 250m SIN Grid (R) 1
MOD09GST	MODIS/Terra Surface Reflectance Quality Daily L2G Global 1km SIN Grid (R) 1
MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m SIN Grid (R) 1
MODPTQKM	MODIS/Terra Observation Pointers Daily L2G Global 250m SIN Grid (R) 1
MODMGGAD	MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid Day (R) 1

Dynamic Product Output ESDT

MOD13A1	MODIS/Terra Vegetation Indices 16-Day L3 Global 500m SIN Grid (A _M) (A _D) 1
MOD13Q1	MODIS/Terra Vegetation Indices 16-Day L3 Global 250m SIN Grid (A _M) (A _D) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: Vegetation Indices 16-Day L3 Global 250m SIN Grid (Filename contains MOD_SS.MOD13Q1 to identify the particular subsetting product. One file is produced per validation site.) (I _M) 15
MOD_SS	MODIS/Terra Land Subsetting QA Files: Vegetation Indices 16-Day L3 Global 500m SIN Grid (Filename contains MOD_SS.MOD13A1 to identify the particular subsetting product. One file is produced per validation site.) (I _M) 15
BROWSE	MODIS/Terra Browse Products (A _M) (A _D) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 2
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Dynamic Runtime Parameters for Operations

Start date time	<Start time for data observations>
End date time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations*

REPROCESSINGACTUAL metadata field	"processed once"
REPROCESSINGPLANNED metadata field	"further update is anticipated"
product version number	<ESDT Collection VersionID for product produced in this PGE version, e.g., 4.>
BRDFFalg;1=Perform BRDF, 0=Disable BRDF	0
CVMVCFalg;1=Perform CVMVC, 0=Disable CVMVC	1
BRDF Data base file name	None
MinBRDFNumberOfObservations	5
MinBRDFNDVI	-0.3
ExtraMaxBRDFNDVI	0.05
MinCVMVCNumberOfObservations	2
MinCVMVCNVI	-0.3
ExtraMaxCVMVCNVI	0.05

mod_prss_infile_luns	<Lun numbers for products to be subsetted.>
mod_prss_outfile_luns	<Lun numbers for subsetted products.>
PGE25 Version	<Version of PGE25 that appears in the ciList delivered with the code>

*Currently runtime parameters are set to the same values for all profiles of PGE25.

4.26 Level 3 Monthly Vegetation Indices 1km (PGE26)

PGE26 performs the L3 monthly Vegetation Indices processing.

Purpose

PGE26 produces the L3 global monthly Vegetation Indices product (MOD13A3) and the Land QA product (MODLM_QA).

Structure

PGE26 consists of the L3 monthly Vegetation Indices process (MOD_PR13A3) and the Land QA process (MOD_PRLQA).

MODAPS Production

PGE26 runs in MODAPS Recipe AM1M_L14c, which is executed once every calendar month upon the availability of 16-Day vegetation indices products. MODAPS runs PGE26 for each of the Land tiles configured in the Data Processing System. Products archived at MODAPS are the monthly MOD13A3 tiled granules. MODAPS Interim products are MODLM_QA files. MODAPS exports MOD13A3 to the PDR Server for archive and distribution at the LP DAAC.

Production Rules

PGE26 runs after one month of the 16-Day gridded Vegetation Indices (PGE35) output has been produced. The operational scenario is nominally 286 activations per calendar month, representing the processing of one Land gridded tile per PGE run. The Period Specification Production Rule is specified for PGE32.

PGE26 requires the Latitude/Longitude Tiling Production Rule. To execute PGE26, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. Since PGE26 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

The required input products are the 16-day granules of MOD13A2 that overlap the calendar month. The input products have been generated only in day mode. Thus, the output MOD13A3 product is produced only in day mode.

The Production Rules for PGE26 are:

- Period Specification,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD13A2	MODIS/Terra Vegetation Indices 16-Day L3 Global 1km SIN Grid (R) 1
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Dynamic Product Output ESDT

MOD13A3	MODIS/Terra Vegetation Indices Monthly L3 Global 1km SIN Grid (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

Start date time	<Start time for data observations>
End date time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL	"processed once"
REPROCESSINGPLANNED	"further update is anticipated"
LOCALGRANULEIDVERSION metadata field	<The correct MOD13A3 product version. Any integer value is valid. Current value = 2>
PGE26 Version	<Version of PGE26 that appears in the ciList delivered with the code>

4.27 Level 3 16-Day Vegetation Indices CMG (PGE27)

PGE27 performs the L3 16-day CMG Vegetation Indices processing at MODAPS.

Purpose

PGE27 produces the 16-day global Vegetation Indices CMG product at 0.05 degrees resolution (MOD13C1) and the Land QA product (MODLM_QA).

Structure

PGE27 consists of the 16-day CMG Vegetation Indices process (MOD_PR13C1) and the Land QA process (MOD_PRLQA).

MODAPS Production

PGE27 runs in MODAPS Recipe AM1M_L23, which is executed every day upon the availability of all required Land tiled granules of MOD13A2 covering the 16-day processing period and required for the 16-day CMG product. Products archived at MODAPS are granules of the 16-day Vegetation Indices CMG product, MOD13C1. MODAPS Interim products are MODLM_QA files. MODAPS exports MOD13C1 to the PDR Server for archive and distribution at the LP DAAC.

Production Rules

PGE27 runs after 16 days of L3 Vegetation Indices (PGE35) processing has completed for all tiles for the 16-day period. The operational scenario is nominally one activation every 16-days. The Period Start of 16 Days Production Rule is required for PGE27. PGE27 will require a "Smart" Start of Year Production Rule at the end of each year.

The required input is MOD13A2, which has been generated only in day mode. Thus, the output product is produced only in day mode. The gridded MOD13C1 product is generated from all of the available 16-day tiles of MOD13A2. PGE27 will process a maximum of 460 tiles. A Minimum Number of Granules, representing the number of 16-day tiles, is specified for MOD13A2 and a time-out is associated for running PGE27 if the minimum requirements are met. The current minimum number required is 1 tile.

The Production Rules for PGE27 are:

- Period Start of 16 Days,
- "Smart" Start of Year,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD13A2

MODIS/Terra Vegetation Indices 16-Day L3 Global
1km SIN Grid (R) 1

Dynamic Product Output ESDT

MOD13C1	MODIS/Terra Vegetation Indices 16-Day L3 Global 0.05Deg CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

start date time	<Start time for data observations>
end date time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS; Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL metadata field	"processed once"
REPROCESSINGPLANNED metadata field	"further update is anticipated"
Product version number	<ESDT Collection VersionID for products of this PGE Version; any integer is valid; current setting is 4>
PGE35 version number	<Version of PGE35 that appears in the ciList delivered with the code>

4.28 Level 3 Monthly Vegetation Indices CMG (PGE28)

PGE28 performs the L3 monthly CMG Vegetation Indices processing at MODAPS.

Purpose

PGE28 produces the monthly global Vegetation Indices CMG product at 0.05 degrees resolution (MOD13C2) and the Land QA product (MODLM_QA).

Structure

PGE28 consists of the monthly CMG Vegetation Indices process (MOD_PR13C2) and the Land QA process (MOD_PRLQA).

MODAPS Production

The MODIS Science Team has not yet delivered PGE28.

Production Rules

PGE28 runs after one month of L3 Vegetation Indices Monthly (PGE26) output has been processed. The operational scenario is nominally one activation every calendar month. The Period Specification Production Rule is required for PGE28.

The required input is MOD13A3. The global MOD13C2 product is generated from all of the available monthly tiles of MOD13A3, which have been generated only in day mode. Thus, the output product is produced only in day mode. A Minimum Number of Granules, representing the number of monthly tiles, is specified for MOD13A3 and a time-out is associated for running PGE28 if the minimum requirements are met.

The Production Rules for PGE28 are:

- Period Specification,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD13A3	MODIS/Terra Vegetation Indices Monthly L3 Global 1km SIN Grid (R) *
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Dynamic Product Output ESDT

MOD13C2	MODIS/Terra Vegetation Indices Monthly L3 Global 0.05Deg CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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*The MODIS Science Team has not delivered PGE28; the minimum number of files required for production is unavailable.

4.29 Level 3 Daily and 8-Day Thermal Anomalies/Fire (PGE29)

PGE29 performs the L3 daily and 8-day Thermal Anomalies/Fire processing at MODAPS.

Purpose

PGE29 produces the L3 daily and 8-day Thermal Anomalies/Fire products (MOD14A1 and MOD14A2), the Land QA product (MODLM_QA), and the subsetted MOD14A1 and MOD14A2 products (MOD_SS)

Structure

PGE29 consists of the composite Thermal Anomalies process (MOD_PR14A) and the Land QA process (MOD_PRLQA). PGE29 also runs the Land Shared MOD_PRSS pl. script to produce the subsetted products.

MODAPS Production

PGE29 runs in MODAPS Recipe AM1M_L10, which is executed every 8 days upon the availability of all of the expected L2G granules of land products covering the 8-Day processing period. MODAPS runs PGE29 for each of the Land tiles configured in the data processing system upon the availability of MOD14GD and MOD14GN. Products archived at MODAPS are the daily MOD14A1 and 8-day MOD14A2 tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD14A1 and MOD14A2 to the PDR Server for archive and distribution at the LP DAAC.

Production Rules

PGE29 runs after eight days of L2G Thermal Anomalies/Fire (PGE13) processing has completed. Out of the total number of 460 Land tiles defined in the Sinusoidal Grid, PGE29 generates products for 286 tiles. The MODAPS Loader for PGE29 selects the tiles to be processed. The operational scenario is 286 activations every 8-days, representing the processing of one Land tile per PGE execution. Each PGE run produces the MOD14A2 8-day composite product granule and one MOD14A1 product granule containing 8 daily collections corresponding to the number of input L2G granules. One dimension in the 3-D SDS in MOD14A1 corresponds to the day in the 8-day cycle. The Period Start of 8 Days Production Rule is required for PGE29. PGE29 will require a "Smart" Start of Year Production Rule at the end of each year.

PGE29 requires the Latitude/Longitude Tiling Production Rule. To execute PGE29, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. For each individual execution, MODAPS will create a recipe instance with a particular Tile ID and pass the Tile ID back to the PGE. Since PGE29 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter for use by the PGE.

The required inputs are MOD14GD and MOD14GN since the day mode and night mode data are to be processed together. Day and night mode products are contained in the same MOD14A1 and MOD14A2 output files.

Several Runtime Parameters must be set in the PCF. PGE29 uses several dynamic runtime parameters set by MODAPS, including the start and end date time for the data observations and the SatelliteInstrument that identifies the Spacecraft platform for the MODIS Instrument as either AM-1 or PM-1. PGE29 also uses several Static runtime parameters, including ReprocessingActual, ReprocessingPlanned, product version number, and PGE version number.

The Production Rules for PGE29 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Metadata Based Query,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD14GD	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km SIN Grid Day (R) 1*
MOD14GN	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km SIN Grid Night (R) 1*

Dynamic Product Output ESDT

MOD14A1	MODIS/Terra Thermal Anomalies/Fire Daily L3 Global 1km SIN Grid (A _M) A _D) 1
MOD14A1C	MODIS/Terra Coarse Thermal Anomalies/Fire Daily L3 Global 1km SIN Grid (I _M) 1
MOD14A2	MODIS/Terra Thermal Anomalies/Fire 8-Day L3 Global 1km SIN Grid (A _M) A _D) 1
MOD14A2C	MODIS/Terra Coarse Thermal Anomalies/Fire 8-Day L3 Global 1km SIN Grid (I _M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files; Thermal Anomalies/Fire Daily L3 Global 1km SIN Grid (File names contain MOD_SS.MOD14A1 to identify the particular subsetted product.) (I _M) 1+
MOD_SS	MODIS/Terra Land Subsetting QA Files; Thermal Anomalies/Fire 8-Day L3 Global 1km SIN Grid

(Filename contains MOD_SS.MOD14A2 to identify the particular subsetted product.) (I_M) 1+

Quality Control or Diagnostic Output ESDT

MODLM_QA MODIS/Terra Land Quality Assurance (I_M) 2

*Either 1 granule of MOD14GD or MOD14GN is required.

*One file produced per validation site; maximum of 15 sites allowed.

Dynamic Runtime Parameters for Operations

TileSchemeID	<Set of tiles to be produced>
TileID	<Tile identification number (value = 8 digit integer that specifies the specific tile within the current requested tile scheme)>
start date time	<Start time for data observations>
end date time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL metadata field	"reprocessed"
REPROCESINGPLANNED metadata field	"further update is anticipated"
product version number	<ESDT Collection VersionID for product produced in this PGE version.>
mod_prss_infile_luns	<Lun numbers for products to be subsetted.>
mod_prss_outfile_luns	<Lun numbers for subsetted products.>
PGE29 version number	<Version of PGE29 that appears in the ciList delivered with the code>

4.30 Level 2 Thermal Anomalies/Fire (PGE30)

PGE30 performs processing for L2 Land Thermal Anomalies/Fire at MODAPS.

Purpose

PGE30 produces Land L2 Thermal Anomalies/Fire (MOD14), the corresponding coarse resolution product (MOD14CRS), a BROWSE product, and the Land QA product (MODLM_QA).

Structure

PGE30 consists of the MOD_PR14, the BROWSE process (MOD_PRbrowse) and the Land QA process (MOD_PRLQA).

MODAPS Production

The MODAPS Recipe plan containing PGE30 is submitted each day. There is no requirement that all input granules be available at the time of submittal. PGE30 is run in MODAPS Recipe AM1M_L1, which is executed for every 5-minute data period upon the availability of Geolocation Fields (MOD03) and L1B at 1 km (MOD021KM). Products archived at MODAPS are 5-minute granules of MOD14, one per PGE run. MODAPS Interim products for the same period are MOD14CRS and MODLM_QA. MODAPS exports MOD14 to the PDR Server for archive and distribution at the LP DAAC. PGE30 also produces a BROWSE product and exports it to the LP DAAC.

Production Rules

PGE30 runs after the Geolocation Fields and L1B products arrive from the GES DAAC. For every temporally-matched set of input granules, PGE30 will output one 5-minute granule of MOD14.

PGE30 makes use of the SatelliteInstrument dynamic runtime parameter from MODAPS. This parameter indicates the spacecraft platform for the MODIS Instrument. The value is either "AM1M" or "PM1M". PGE30 also uses the starttime and endtime dynamic runtime parameters set by MODAPS and several static runtime parameters set by the PGE script for operations.

The Production Rules for PGE30 are:

- Basic Temporal,
- Runtime Parameters.

Data Files

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1

Dynamic Product Output ESDT

MOD14	MODIS/Terra Thermal Anomalies/Fire 5-Min L2 Swath 1km	(A _M)	(A _D)	1
MOD14CRS	MODIS/Terra Coarse Thermal Anomalies/Fire 5-Min L2 Swath 5km	(A _M)		1
BROWSE	MODIS/Terra Browse Products	(A _M)	(A _D)	1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance	(I _M)		1
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Dynamic Runtime Parameters for Operations

Satellite Instrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>
STARTTIME	<Start time of input data>
ENDTIME	<Ending time of input data>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL metadata field	"reprocessed"
REPROCESSINGPLANNED metadata field	"further update is anticipated"
product version number	<Value of collection version>
force internal cloud mask for fire; 1=yes, 0=no	1
produce coarse resolution fire product; 1=yes, 0=no	1
PGE version number	<version of PGE30 that appears in the ciList delivered with the code>

4.31 Level 3 8-Day Land Surface Temperature (PGE31)

PGE31 performs the L3 8-day Land Surface Temperature (LST) processing at MODAPS.

Purpose

PGE31 produces gridded 8-day LST/Emissivity product (MOD11A2), the Land QA product (MODLM_QA), and the subsetted MOD11A2 product (MOD_SS).

Structure

PGE31 consists of the L3 LST 8-day process (MOD_PR11A) and the Land QA process (MOD_PRLQA). PGE31 also runs the Land Shared MOD_PRSS pl. script to produce the subsetted products.

MODAPS Production

PGE31 runs in MODAPS Recipe AM1M_L10, which is executed once every 8 days upon the availability of MOD11A1 daily tiled products for the 8 days in the processing period. Products archived at MODAPS are the 8-Day MOD11A2 tiled granules. MODAPS Interim products are granules of MOD_SS and MODLM_QA. MODAPS exports MOD11A2 to the PDR Server for archive and distribution at the LP DAAC.

Production Rules

PGE31 runs after 8 days of L2/L3 Land Surface Temperature (PGE16) processing has been completed. Out of the total number of Land tiles defined over the surface of the Earth in the Sinusoidal Grid, PGE31 generates products for 317 tiles. The MODAPS Loader for PGE31 selects the tiles to be processed. The operational scenario is 317 or less activations every eight days, representing the processing of one land tile per PGE execution. The Period Start of 8 Days Production Rule is required for PGE31. PGE31 will require a "Smart" Start of Year Production Rule at the end of each year.

PGE31 requires the Latitude/Longitude Tiling Production Rule. To execute PGE31, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. For each individual execution, MODAPS will create a recipe instance for a particular Tile ID. Since PGE31 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter for use by the PGE.

The MOD11A1 input product to PGE31 has been generated by PGE16 as a tiled product for which the tiles correspond to other Land products. PGE16 produced its tiled granules according to its internal tiling scheme.

The MOD11A1 input product is required. This product is generated with a mixture of day mode and night mode data. Thus, the output MOD11A2 product will have the day and night modes mixed in the tiles.

The Production Rules for PGE31 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD11A1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 1km SIN Grid (R) 1
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Dynamic Product Output ESDT

MOD11A2	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 1km SIN Grid (A _M) (A _D) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files; Land Surface Temperature/Emissivity Daily L3 Global 1km SIN Grid (Filename contains MOD_SS.MOD11A2 to identify the particular subsetted product.) (I _M) 1+

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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+ One file produced per validation site; maximum of 15 sites allowed.

Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

PGE31 Version	<Version of PGE31 that appears in the ciList delivered with the code>
REPROCESSINGACTUAL	“reprocessed”
REPROCESSINGPLANNED	“further update is anticipated”
mod_prss_infile_luns	<Lun number for product to be subsetted.>
mod_prss_outfile_luns	<Lun number for subsetted product.>
N_DBG	Value = 1
N_READ_LINES	Value = 100

4.32 Level 3 Daily Land Surface Temperature CMG (PGE32)

PGE32 performs the L3 daily CMG Land Surface Temperature processing at MODAPS.

Purpose

PGE32 produces CMG daily LST/Emissivity product (MOD11C1) and the Land QA product (MODLM_QA).

Structure

PGE32 consists of the Level 3 CMG LST daily process (MOD_PR11C1) and the Land QA process (MOD_PRLQA).

MODAPS Production

PGE32 runs in MODAPS Recipe AM1M_L7, which is executed every day upon the availability of all of the expected tiles of the daily 5km Land Surface Temperature product (MOD11B1) from PGE16. The product archived at MODAPS is the Daily MOD11C1 global CMG map. The MODAPS Interim product is MODLM_QA. MODAPS exports MOD11C1 to the PDR Server for archive and distribution at the LP DAAC.

Production Rules

PGE32 runs after one day of gridded daily Land Surface Temperature/Emissivity (PGE16) output has been produced. The operational scenario is nominally one activation per day. The Period Specification Production Rule is required for PGE32. The required input is MOD11B1. The gridded MOD11C1 product is generated from all of the available 317 tiles of gridded daily LST at 5km resolution. A Minimum Number of Granules, representing the number of daily tiles, is specified for MOD11B1 and time-outs are associated for running PGE32 if the minimum requirements are met. The first set of values is all 317 tiles with a wait time of two days. The second set of values is at least 310 tiles with a wait time of two more days. After that PGE32 is run if there are at least 160 tiles.

The Production Rules for PGE32 are:

- Period Specification,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD11B1	MODIS/Terra Land Surface Temperature/ Emissivity Daily L3 Global 5km SIN Grid (R) 317
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Dynamic Product Output ESDT

MOD11C1	MODIS/Terra Land Surface Temperature/ Emissivity Daily L3 Global 0.05Deg CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA MODIS/Terra Land Quality Assurance (I_M) 1

Dynamic Runtime Parameters for Operations

SatelliteInstrument <Spacecraft platform for MODIS Instrument
supplied by MODAPS. Value = {AM1M, PM1M}>

ProcessingEnvironment <Computer platform on which PGE is run;
determined by the PGE perl script.>

Static Runtime Parameters for Operations

ReprocessingPlanned value	"further update is anticipated"
ReprocessingActual value	"reprocessed"
PGE32 Version	<Version of PGE32 that appears in the ciList delivered with the code>

4.33 Level 4 Daily Leaf Area Index/FPAR (PGE33)

PGE33 performs the L4 daily Leaf Area Index (LAI) /FPAR processing at MODAPS.

Purpose

PGE33 produces the L4 daily Leaf Area Index/FPAR product (MOD15A1) the corresponding 5km coarse product (MOD15A1C), the subsetting MOD15A1 products (MOD_SS), and the corresponding Land QA product (MODLM_QA).

Structure

PGE33 consists of the L4 daily gridded LAI/FPAR process (MOD_PR15A1) and the Land QA process (MOD_PRLQA). PGE33 also runs the Land shared MOD_PRSS.pl Script to produce the subsetting products.

MODAPS Production

PGE33 runs in MODAPS Recipe AM1M_L5, which is executed every day upon the availability of MODAGAGG granules covering the daily processing period. MODAPS runs PGE 33 for each of the Land tiles configured in the Data Processing System after the MODAGAGG is produced in this Recipe by PGE22. MOD12Q1, the Land Cover Type file, must also be staged for PGE33. Products archived at MODAPS are the daily MOD15A1 and MOD15A1C tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. No products from PGE33 are exported to a DAAC.

Production Rules

PGE33 runs after the daily L3 Aggregation (PGE22) outputs are completed. Out of the total number of Land tiles defined over the surface of the Earth in the Sinusoidal Grid, PGE33 generates products for 286 tiles. The operational scenario is 286 activations per day, representing the processing of one land tile per PGE execution. The Period Specification Production Rule is required for PGE33 to generate the daily tile products.

The required inputs are MODAGAGG and MOD12Q1. MODAGAGG has been generated only in day mode. Thus, the output product MOD15A1 is produced only in day mode. The MOD12Q1 input, which is the MODIS Level 3 Land Cover Type product at 1km resolution generated from PGE41, is also created only in day mode. For the first part of the mission, MOD12Q1 was not available. The University of Maryland MODIS Group generated a L3 quarterly land cover product from other satellite data in the same format as the MOD12Q1 to be used to provide the land cover information during the first part of the mission. This MOD12Q1 file was stored as a static data file in the MOD15LUT. When the dynamic MOD12Q1 files were produced, the Advanced Temporal Production Rule was used to set a delta time to acquire the proper MOD12Q1 granule. For the reprocessing of Land Terra data into Collection 4, the MOD12Q1 was changed to a yearly product.

PGE33 requires the Latitude/Longitude Tiling Production Rule. To execute PGE33, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes

containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. The MODAPS Loader for PGE33 selects the tiles to be processed. For each individual execution, MODAPS will create a recipe instance with a particular Tile ID and pass the Tile ID back to the PGE. Since PGE33 now obtains the TileID the start date/time, and the end date/time from the input products, MODAPS does not need to set the TileID and data dates as dynamic runtime parameters for use by the PGE.

The Production Rules for PGE33 are:

- Period Specification,
- Advanced Temporal,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MOD15LUT	MODIS/Terra LUTs for Production of MOD15A1 Daily Products
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Dynamic Product Input ESDT

MODAGAGG	MODIS/Terra BRDF Preprocessing Database Daily L3 Global 1km SIN Grid (R) 1
MOD12Q1	MODIS/Terra Land Cover Type Yearly L3 Global 1km SIN Grid (R) 1

Dynamic Product Output ESDT

MOD15A1	MODIS/Terra Leaf Area Index/FPAR Daily L4 Global 1km SIN Grid (A_M) 1
MOD15A1C	MODIS/Terra Coarse Leaf Area Index/FPAR Daily L4 Global 5km SIN Grid (A_M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: Leaf Area Index/FPAR Daily L4 Global 1km SIN Grid (File name contains MOD_SS.MOD15A1 to identify the particular subsetting product.) (I_M) 1+

* One file produced per validation site; maximum of 15 sites allowed.

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance	(I _M)	2
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Temporary Output Files

Temporary log file written by MOD_PR15A1, MOD15A1.log

Dynamic Runtime Parameters for Operations

TileSchemeID	<Set of tiles to be produced>
TileID	<Tile identification number (value = 8 Digit integer that specifies the specific tile within the current requested tile scheme)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

SizeMBECSDData Granule value	<File size; Value = 5.69449>
ReprocessingPlanned value	"further update is anticipated"
Rep;rocessingActual value	"reprocessed"
FPAR_PCF_PARAMNAME	MOD15A1
FPAR_PCF_PARAMNAME_COARSE	MOD15A1C
FPAR_PCF_NBAND	2
FPAR_PCF_NSAT	41
FPAR_PCF_VIEWPOLDIM	5
FPAR-PCF-VIEWAZIDIM	6
FPAR_PCF_SUNPOLDIM	4
FPAR_PCF_EPS00	1.00
FPAR_PCF_EPS01	1.00
FPAR_PCF_EPSSAT	0.10
FPAR_PCF_ENGDATA	0
FPAR_PCF_MBR	0
FPAR_PCF_THRESHOLD	0.50
FPAR_PCF_METHOD	2
FPAR_PCF_BROWSE	5, 5, HDFEOS
FPAR_PCF_LANDCOV_FLD	3
mod_prss_infile_luns	<Lun for product to be subsetted.>
mod_prss-outfile_luns	<Lun for subsetted product.>
PGE33 Version	<Version of PGE33 that appears in the cList delivered with the code>

4.34 Level 4 8-Day Leaf Area Index/FPAR (PGE34)

PGE34 performs the L4 8-Day Leaf Area Index (LAI) /FPAR processing at MODAPS.

Purpose

PGE34 produces L4 8-day LAI/FPAR product (MOD15A2), the corresponding coarse resolution product (MOD15A2C), a BROWSE product, the Land QA product (MODLM_QA), and the subsetted MOD15A2 product (MOD_SS).

Structure

PGE34 consists of the L4 daily LAI/FPAR process (MOD_PR15A2) and the Land QA process (MOD_PRLQA). PGE34 also runs the Land shared MOD_PR.SS.pl script to produce the subsetted products and runs the BROWSE (MOD_PRbrowse).

MODAPS Production

PGE34 runs in MODAPS Recipe AM1M_L10 which is executed every 8 days upon the availability of all required input daily Land products covering the 8-day processing period. MODAPS runs PGE34 for each of the Land tiles configured in the Data Processing System after MOD15A1 daily products are produced. Products archived at MODAPS are the 8-Day MOD15A2 and MOD15A2C tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD15A2 to the PDR Server for archive and distribution at the LP DAAC. PGE34 also produces a BROWSE product and exports it to the LP DAAC.

Production Rules

PGE34 runs after eight days of L4 daily LAI/FPAR (PGE33) outputs are completed. Out of the total number of Land tiles defined over the surface of the Earth in the Sinusoidal Grid, PGE34 generates products for 286 tiles. The MODAPS Loader for PGE34 selects the tiles to be processed. The operational scenario is 286 activations every eight days, representing the processing of one land tile per PGE execution. The Period Start of 8 Days Production Rule is required for PGE34 to generate the 8-day tiled products. PGE34 will require a “Smart” Start of Year Production Rule at the end of each year.

The required input is MOD15A1 which has been generated only in day mode. Thus, the output product MOD15A2 and coarse resolution product MOD15A2C are produced only in day mode.

PGE34 requires the Latitude/Longitude Tiling Production Rule. To execute PGE34, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. For each individual execution, MODAPS will create a recipe instance with a particular Tile ID and pass the Tile ID back to the PGE. Since PGE34 now obtains the TileID, the start date/time, and the end date/time from the input products, MODAPS does not need to set the TileID and data dates as dynamic runtime parameters for use by the PGE.

The Production Rules for PGE34 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MOD15LU8	MODIS/Terra LUTs for Production of MOD15A2 8-Day Products
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Dynamic Product Input ESDT

MOD15A1	MODIS/Terra Leaf Area Index/FPAR Daily L4 Global 1 km SIN Grid (R) 2
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Dynamic Product Output ESDT

MOD15A2	MODIS/Terra Leaf Area Index/FPAR 8-Day L4 Global 1 km SIN Grid (A _M) (A _D) 1
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MOD15A2C	MODIS/Terra Coarse Leaf Area Index/FPAR 8-Day L4 Global 5km SIN Grid (I _M) 1
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MOD_SS	MODIS/Terra Land Subsetting QA Files; Leaf Area Index/FPAR 8-Day L4 Global 1 km SIN Grid (Filename contains MOD_SS.MOD15A2 to identify the particular subsetting products.) (I _M) 1 ⁺
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BROWSE	MODIS/Terra Browse Products A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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⁺ One file produced per validation site; maximum of 15 sites allowed.

Dynamic Runtime Parameters for Operations

TileSchemeID	<Set of tiles to be produced>
TileID	<Tile identification number (value = 8 digit integer that specifies the specific tile within the current requested tile scheme)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS Value = {AM1M, PM1M}>

ProcessingEnvironment <Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

SizeMBECSData Granule value	15.5
ReprocessingPlanned value	"further update is anticipated"
ReprocessingActual value	"reprocessed"
ParameterName value	MODPR15A2
ParameterName value	MODPR15A2C
LCMP_PCF_ENGDATA	0
LCMP_PCF_MBR	0
LCMP_PCF_BROWSE	0
mod_press_infile_luns	<Lun number for product to be subsetted.>
mod_prss_outfile_luns	<Lun number for subsetted product.>
PGE34 Version	<Version of PGE34 that appears in the ciList delivered with the code>

4.35 Level 3 16-Day Vegetation Indices 1km (PGE35)

PGE35 performs the L3 16-day (1 km) Vegetation Indices processing at MODAPS.

Purpose

PGE35 produces the 16-day gridded Vegetation Indices product (MOD13A2) the corresponding 5km coarse resolution product (MOD13A2C), a BROWSE product, the Land QA product (MODLM_QA), and the subsetted MOD13A2 product (MOD_SS).

Structure

PGE35 consists of the 16-day gridded Vegetation Indices (1 km) process (MOD_PR13A2) and the Land QA process (MOD_PRLQA). PGE35 also runs the Land shared MOD_PRSS.pl script to produce the subsetted products and runs the BROWSE process (MOD_PRbrowse).

MODAPS Production

PGE35 runs in MODAPS Recipe AM1M_L12, which is executed every 16 days upon the availability of all required input daily MODAGAGG products covering the 16-day processing period. MODAPS runs PGE35 for each of the Land tiles configured in the Data Processing System after all 16 days of the MODAGAGG daily products are completed. Products archived at MODAPS are the 16 Day MOD13A2 tiled granules. MODAPS Interim products are MOD13A2C, MOD_SS, and MODLM_QA. MODAPS exports MOD13A2 to the PDR Server for archive and distribution at the LP DAAC. PGE35 also produces a BROWSE product and exports it to the LP DAAC.

Production Rules

PGE35 runs after 16 days of the L3 Aggregation (PGE22) outputs have been produced. Out of the total number of Land tiles defined in the Sinusoidal Grid, PGE35 generates products for 286 tiles. The operational scenario is nominally 286 activations per 16 days, representing the processing of one Land gridded tile per PGE run. The Period Start of 16 days Production Rule is specified for PGE35. PGE35 will require a “Smart” Start of Year Production Rule at the end of each year.

PGE35 requires the Latitude/Longitude Tiling Production Rule. To execute PGE35, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. For each individual execution, MODAPS will create a recipe instance with a particular Tile ID and pass the Tile ID back to the PGE. Since PGE35 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter. A maximum of 16 daily granules of MODAGAGG are staged for each tile run, but the PGE maybe run with the minimum specified.

The required input product is MODAGAGG. MODAGAGG has been generated only in day mode. Thus, the output MOD13A2 product is produced only in day mode.

The Production Rules for PGE35 are:

- Period Start of 16 Days,
- “Smart” Start of Year,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MODAGAGG	MODIS/Terra BRDF Preprocessing Database Daily L3 Global 1km SIN Grid (R) 1
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Dynamic Product Output ESDT

MOD13A2	MODIS/Terra Vegetation Indices 16-Day L3 Global 1km SIN Grid (A _M) (A _D) 1
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MOD13A2C	MODIS/Terra Coarse Vegetation Indices coarse Product 16-Day L3 Global 5 km SIN Grid (I _M) 1
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MOD_SS	MODIS/Terra Land Subsetting QA Files: Vegetation Indices 16-Day L3 Global 1km SIN Grid (Filename contains MOD_SS.MOD13A2 to identify the particular subteted products. One file is produced per validation site). (I _M) 15
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BROWSE	MODIS/Terra Browse Products A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 2
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Dynamic Runtime Parameters for Operations

start date time	<Start time for data observations>
end date time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL metadata field	“processed once”
REPROCESSINGPLANNED metadata field	“further update is anticipated”
Product version number	<ESDT Collection VersionID for products of this PGE version>
BRDF method Flag for compositing	<1=Perform BRDF,0=Disable BRDF; Operations value = 1>

CVMVC method Flag for compositing	<1=Perform CVMVC,0=Disable CVMVC;Operations value =1>
BRDF Data base file name	None
MinBRDFNumberofobservations	5
MinBRDFNDVI	-0.3
ExtraMaxBRDFNDVI	0.05
MinCVMVCNumberOfObservations	2
MinCVMVCNVI	-0.3
ExtraMaxCVMVCNDVI	0.05
mod_prss_infile_luns	<Lun for product to be subsetted>
mod_prss_outfile_luns	<Lun for subsetted product>
PGE35 version number	<Version of PGE35 that appears in the ciList delivered with the code>

4.36 Level 4 Daily Net Photosynthesis (PGE36)

PGE36 performs the daily L4 Net Photosynthesis (PSN) processing at MODAPS.

Purpose

PGE36 produces the L4 daily Net Photosynthesis product (MOD17A1) and the Land QA product (MODLM_QA).

Structure

PGE36 consists of the L4 PSN daily process (MOD_PR17A1) and the Land QA process (MOD_PRLQA), and a first-in-year initialization (MOD_PR17A0).

Although the two executables, MOD_PR17A0 and MOD_PR17A1, are discussed as separate executables, they are the same software controlled by a runtime parameter. The runtime parameter tells the executable to behave either as MOD_PR17A0, or as MOD_PR17A1. When PSN_PCF_BOUNDARY = 0, the executable behaves as MOD_PR17A0. When PSN_PCF_BOUNDARY = 1 the executable behaves as MOD_PR17A1.

MODAPS Production

PGE36 is run in MODAPS Recipe AM1M_L16a which is executed everyday upon the availability of the 8-day MOD15A2 product covering the daily processing period. MODAPS runs PGE36 once every year using the parameter switch to execute MOD_PR17A0, the initialization process, to produce initialized files of daily PSN (MOD17A1) for each of the Land tiles configured in the Data Processing System. MODAPS then runs PGE36 using the parameter switch to execute MOD_PR17A1 to update the daily information for each tile after the MOD15A2 product is made by PGE34. Products archived at MODAPS are the updated daily tiles of PSN (MOD17A1). MODAPS Interim products are granules of MODLM_QA. MODAPS does not export any product from PGE36 to the PDR Server for archive at one of the DAACs.

Production Rules

Before MOD_PR17A1 can be run on a daily basis, an initialization step is required. This initialization is performed once every year before any daily products are produced for that year. MOD_PR17A0 performs the initialization. It produces 286 zeroed-out MOD17A1 Land tiles. To achieve this, MOD_PR17A0 is executed 286 times, once for each tile. During the first execution for each tile, the runtime parameter PSN_PCF_BOUNDARY is set to 0, which causes the MOD17A1 initialized tile to be created. During all subsequent executions, PSN_PCF_BOUNDARY is set to 1, which causes each tile of MOD17A1 tiles to be filled with data.

Following the initialization step, PGE36 runs every day. It uses the most recent eight-day MOD15A2 and thus it runs typically eight days behind PGE33. The Advanced

Temporal Production Rule is needed to stage MOD15A2. The operational scenario is nominally 286 activations per day, representing the processing of one land tile per PGE execution. The Period Specification Production Rule is required for PGE36 to generate the daily tile products. The required input product is the 8-day LAI/FPAR (MOD15A2), which has been generated only in day mode. Thus, the output PSN (MOD17A1) product is produced only in day mode. Other required inputs are the previous update MOD17A1 file, the previous MOD12Q1, and D4LAXMNT.

PGE36 requires the Latitude/Longitude Tiling Production Rule. To execute PGE36, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. For each individual execution, MODAPS will create a recipe instance with a particular Tile ID and pass the Tile ID back to the PGE. Since PGE36 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

The production rules for the series of daily (PGE36), 8-day (PGE37), and yearly (PGE38) MODIS Land Level 4 PSN and NPP PGEs require an update capability for the MOD17A1. MODAPS provides a file update capability and some customized scheduling interfaces among PGEs which run on daily, periodic N-day cycles, and yearly cycles. The source code for all three PGEs is the same, but the PCF contains a dynamic runtime parameter, PSN_PCF_BOUNDARY, that is set to different values for the three PGEs. The sections below contain the value of the PSN_PCF_BOUNDARY parameter for the two cases of PGE36 and a description of what happens when PGE36 is executed. The cases for PGE37 and PGE38 are discussed in their respective sections.

PSN_PCF_BOUNDARY = 0

PGE36 is executed to start an annual period. On January 1 of a given processing year, MOD_PR17A0 writes a fresh (zero-filled) instance of the daily interim, PSN files, MOD17A1, for each of the Land tiles to be processed. In accord with other Land PGEs, PGE36 is executed once for each Land tile. The MOD17A1 files must be staged for update of its daily intermediate grid fields for the entire modeling year. The internal SDS matrices are dimensioned by 368 (365 days in the current year + 3 days in next year) to cover the last 8-day cycle which is extended to the next year. As a special case, PGE36 is executed with this parameter value of 0 for the very first day that MODIS data are processed during the mission to initialize the MOD17A1 interim files.

PSN_PCF_BOUNDARY = 1

PGE36 is executed every day starting with January 2 of each year, once for each of the Land tiles. To complete the last 8-day cycle of the year, PGE36 is executed for three extra days into the next year for a regular year and two extra days into the next year for a leap year. MOD_PR17A1 processes days 1 to 8 in an 8-day cycle (2 to 8 in the first cycle of the year). The order for the 8 days does not matter. Each subsequent day, the grid fields in the interim files of MOD17A1 are updated for each tile at the proper day position in the file.

The Production Rules for PGE36 are:

- Period Specification,
- Advanced Temporal,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MOD17LUT	MODIS/Terra LUTs for Production of MOD17A Products
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Dynamic Ancillary Product Input ESDT

D4LAXMNT	DAO DAS GEOS-4 Late Look Special Montana Subset daily global climatology file (required for MOD_PR17A1, but not used by MOD_PR17A0). (R) 1
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Dynamic Product Input ESDT

MOD15A2	MODIS/Terra Leaf Area Index/ FPAR 8-Day L4 Global 1km SIN Grid (R) 1
MOD12Q1	MODIS/Terra Land Cover Type Yearly L3 Global 1km SIN Grid (R) 1
MOD17A1	MODIS/Terra Net Photosynthesis Daily L4 Global 1km SIN Grid (File is updated daily for an entire year.) (R) 1

Dynamic Product Output ESDT

MOD17A1	MODIS/Terra Net Photosynthesis Daily L4 Global 1km SIN Grid (File is updated daily for an entire year.) (A _M) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

PSN_PCF_BOUNDARY	<Processing control switch: 0 for running the first-in year MOD_PR17A0 session, 1 for running the daily MOD_PR17A1 session.>
PSN_PCF_LANDCOV_FLD	<Flag indicating which Land Cover file to use for MOD12Q1: 0 = use IGBP land cover definition, 1 = use Land_Cover_Type_2. (Value for operations = 1)>
SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by MODAPS value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

PSN_PCF_MBR	<Optional spatial minimum boundary rectangle to constrain session; Default: 0 = full 1200 x 1200 tile.>
PSN_PCF_BROWSE	<Optional generation of browse product; 1 = browse, 0 = no browse. (Value for operations = 0)>
PSN_PCF_ENG	<Switch for echo of engineering metrics log; 0 = no log, 1 = echo log. (Value for operations = 0)>
PSN_PCF_YEARDAY	<Three digit year day ; format = ddd.>
SizeMBECSDataGranule value	5.69449
ReprocessingPlanned value	"further update is anticipated"
ReprocessingActual value	"reprocessed"
PGE36 Version	<Version of PGE36 that appears in the ciList delivered with the code>
ParameterName value	MOD17A1

4.37 Level 4 8-Day Net Photosynthesis (PGE37)

PGE37 performs the L4 Net Photosynthesis (PSN) 8-day processing at MODAPS.

Purpose

PGE37 produces the L4 PSN 8-day product (MOD17A2), the corresponding coarse resolution product (MOD17A2C), the Land QA product (MODLM_QA), and the subsetting MOD17A2 product MOD_SS.

Structure

PGE37 consists of the PSN 8-day process (MOD_PR17A2) and the Land QA process (MOD_PRLQA). PGE37 also runs the Land shared MOD_PRSS.pl script to produce the subsetting product.

MODAPS Production

PGE37 runs in MODAPS Recipe AM1M_L16b which is executed every 8 days upon the availability of all required input daily Land products covering the 8-day processing period. MODAPS runs PGE37 for each of the Land tiles configured in the Data Processing System after all of the daily MOD17A1 products in the 8-day period are produced. Products archived at MODAPS are the 8-day MOD17A2 tiled granules and the coarse resolution 8-Day MOD17A2C tiled granules. MODAPS Interim products are granules of MOD_SS and MODLM_QA. MODAPS exports MOD17A2 to the PDR Server for archive and distribution at the LP DAAC.

Production Rules

PGE37 runs after eight days of MOD17A1 L4 daily PSN (PGE36) outputs are completed. The operational scenario is nominally 286 activations every 8 days, representing the processing of one Land tile per PGE execution. The Period Start of 8 Days Production Rule is required for PGE37 to generate the 8-day tiled products. PGE37 will require a "Smart" Start of Year Production Rule at the end of each year. The primary required input product is MOD17A1 which has been generated only in day mode. It is updated by PGE37. Thus, the output MOD17A2 product is produced only in day mode. MOD15A2 and MOD12Q1 are also required inputs. Until the MOD12Q1 product was being generated by MODAPS, a static file with data from another satellite, produced by UMD in the same format as MOD12Q1, was staged for PGE37. For the PGE Version 4 processing, MOD12Q1 was changed to a yearly product. Now UMD is delivering data to MODAPS to update MOD12Q1 every month.

PGE37 requires the Latitude/Longitude Tiling Production Rule. To execute PGE37, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. Since PGE37 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

PGE37, the second in the series of PSN and NPP PGEs, is the composite period which occurs every 8 days. It requires the update capability and the periodic scheduling

interfaces provided by MODAPS. There is only one case for PGE37 with the value of the PSN_PCF_BOUNDARY set to 2. A description of what happens when PGE37 is executed is listed below.

PSN_PCF_BOUNDARY = 2

PGE37 is executed when the 8-day composite boundary is triggered. On the eighth day of each cycle, MOD_PR17A2 produces the 8-day PSN (MOD17A2) product file for each Land tile. PGE37 will only be run after all available 8 days of MOD17A1 are done.

PGE37 also resets the two state fields in MOD17A1 for the next 8-day processing period. The last 8-day cycle includes three extra days of the next year for a regular year and two extra days of the next year for a leap year.

The Production Rules for PGE37 are:

Period Start of 8 Days,

- “Smart” Start of Year,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MOD17LUT	MODIS/Terra LUTs for Production of MOD17A Products
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Dynamic Product Input ESDT

MOD17A1	MODIS/Terra Net Photosynthesis Daily L4 Global 1km SIN Grid (R) 1
MOD15A2	MODIS/Terra Leaf Area Index/FPAR 8-Day L4 Global 1km SIN Grid (R) 1
MOD12Q1	MODIS/Terra Land Cover Type Yearly L3 Global 1km SIN Grid (Static file in same format is used until MOD12Q1 production is being performed) (R) 1

Dynamic Product Output ESDT

MOD17A1	MODIS/Terra Net Photosynthesis Daily L4 Global 1km SIN Grid (updated by PGE37) (A_M) 1
MOD17A2	MODIS/Terra Net Photosynthesis 8-Day L4 Global 1km SIN Grid (A_M) (A_D) 1
MOD17A2C	MODIS/Terra Coarse Net Photosynthesis 8-Day L4 Global 5km SIN Grid (A_M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files; MODIS/Terra Net Photosynthesis 8-Day L4 Global

1km SIN Grid (Filename contains MOD_SS.MOD17A2 to identify the particular subsetted product.) (I_M) 1⁺

⁺ One file produced per validation site; maximum of 15 sites allowed.

Quality Control or Diagnostic Output ESDT

MODLM_QA MODIS/Terra Land Quality Assurance (I_M) 2

Dynamic Runtime Parameters for Operations

PSN_PCF_BOUNDARY <Processing control switch: 2 for running the 8-Day MOD_PR17A2 session.>

PSN_PCF_LANDCOV_FLD <Flag indicating which Land Cover file to use for MOD12Q1: 0 = use IGBP land cover definition, 1 = use Land_Cover_Type_2. (Value for operations = 1)>

SatelliteInstrument <Space craft platform for MODIS Instrument supplied by MODAPS; value = {AM1M, PM1M}>

ProcessingEnvironment <Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

PSN_PCF_MBR	<Optional spatial minimum boundary rectangle to constrain session; Default: 0 = full 1200 x 1200 tile.>
PSN_PCF_BROWSE	<Optional generation of browse product; 1 = browse, 0 = no browse. (Value for operations = 0)>
PSN_PCF_ENG	<Switch for echo of engineering metrics log; 0 = no log, 1 = echo log. (Value for operations = 0)>
PSN_PCF_YEARDAY	<Three digit year day ; format = ddd.>
SizeMEBECSDDataGranule value	5.69449
ReprocessingPlanned value	"further update is anticipated"
ReprocessingActual value	"reprocessed"
ParameterName value	MOD17A2
ParameterName value for the coarse product	MOD17A2C
PGE37 Version	<Version of PGE37 that appears in the ciList delivered with the code>

mod_prss_infile_luns
mod_prss_outfile_luns

<Lun for product to be subsetted>
<Lun for subsetted product>

4.38 Level 4 Yearly Net Primary Production (PGE38)

PGE38 performs the yearly L4 Net Primary Production (NPP) processing at MODAPS.

Purpose

PGE38 produces L4 NPP yearly product (MOD17A3), the corresponding coarse resolution product (MOD17A3C), the Land QA product (MODLM_QA), and the and the subsetted MOD17A3 product MOD_SS.

Structure

PGE38 consists of the L4 NPP yearly process (MOD_PR17A3) and the Land QA process (MOD_PRLQA), and the subsetted MOD17A3 product MOD_SS.

MODAPS Production

PGE38 runs in MODAPS Recipe AM1M_L16c that is executed once a year when all daily runs of PGE36 have completed for the year. MODAPS runs PGE38 for each of the Land tiles configured in the Data Processing System. Products archived at MODAPS are the yearly MOD17A3 tiled granules and the coarse resolution MOD17A3C tiled granules. MODAPS Interim products are granules of MOD_SS and MODLM_QA. MODAPS exports MOD17A3 to the PDR Server for archive and distribution at the LP DAAC.

Production Rules

PGE38 runs after one year of L4 8-day PSN (PGE37) outputs are completed. The operational scenario is nominally 286 activations per year, representing the processing of one Land tile per PGE execution. The Period Specification Production Rule and “Smart” Start of Year are required for PGE38 to generate the yearly tiled products. The primary required input product is MOD17A1 which has been generated only in day mode. Thus, the output MOD17A3 and MOD17A3C products are produced only in day mode. The most current LAI/FPAR (MOD15A2) and the yearly Land Cover Type, (MOD12Q1), are also required inputs. Until the MOD12Q1 product was being generated by MODAPS, a static file with data from another satellite, produced by UMD in the same format as MOD12Q1, was staged for PGE38. For the PGE Version 4 processing, MOD12Q1 was changed to a yearly product. Now UMD is delivering data to MODAPS to update MOD12Q1 quarterly.

PGE38 requires the Latitude/Longitude Tiling Production Rule. To execute PGE38, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. Since PGE38 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

PGE38, the third in the series of PSN and NPP PGEs, also requires the update capability and the periodic scheduling interface provided by MODAPS. There is only one case for PGE38 with the value of the PSN_PCF_BOUNDARY set to 3. A description of what happens when PGE38 is executed are described below.

PSA_PCF_BOUNDARY = 3

PGE38 is executed when all of the daily, intermediate grid fields for the entire modeling year have been filled in the MOD17A1 interim update files. PGE38 outputs the annual NPP product, MOD17A3, for each Land tile. The annual product includes three extra days of the next year for a regular year and two extra days of the next year for a leap year.

The Production Rules for PGE38 are:

- Period Specification,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Advanced Temporal,
- “Smart” Start of Year,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MOD17LUT	MODIS/Terra LUTs for Production of MOD17A Products
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Dynamic Product Input ESDT

MOD17A1	MODIS/Terra Net Photosynthesis Daily L4 Global 1km SIN Grid (R) 1
MOD15A2	MODIS/Terra Leaf Area Index/FPAR 8-Day L4 Global 1km SIN Grid (R) 1
MOD12Q1	MODIS/Terra Land Cover Type Yearly L3 Global 1km SIN Grid (R) 1

Dynamic Product Output ESDT

MOD17A3	MODIS/Terra Net Primary Production Yearly L4 Global 1km SIN Grid (A_M) (A_D) 1
MOD17A1	MODIS/Terra Net Photosynthesis Daily L4 Global 1km SIN Grid (updated by PGE38) (A_M) 1
MOD17A3C	MODIS/Terra Coarse Net Primary Production Yearly L4 Global 5km SIN Grid (A_M) 1

MOD_SS MODIS/Terra Land Subsetting QA Files;
 MODIS/Terra Net Primary Production Yearly L4
 Global 1km SIN Grid (Filename contains
 MOD_SS.MOD17A3 to identify the particular
 subsetting product.) (I_M) 1⁺

* One file produced per validation site; maximum of 15 sites allowed.

Quality Control or Diagnostic Output ESDT

MODLM_QA MODIS/Terra Land Quality Assurance (I_M) 2

Dynamic Runtime Parameters for Operations

PSN_PCF_BOUNDARY <Processing control switch: 3 for running
 the yearly MOD_PR17A3 session.>

PSN_PCF_LANDCOV_FLD <Flag indicating which Land Cover file
 to use for MOD12Q1: 0 = use IGBP land
 cover definition, 1 = use
 Land_Cover_Type_2. (Value for
 operations = 1)>

SatelliteInstrument <Spacecraft platform for MODIS Instrument supplied
 by MODAPS. Value = {AM1M, PM1M}>.

ProcessingEnvironment <Computer platform on which PGE is run;
 determined by the PGE perl script.>

Static Runtime Parameters For Operations

PSN_PCF_MBR	<Optional spatial minimum boundary rectangle to constrain session; Default: 0 = full 1200 x 1200 tile.>
PSN_PCF_BROWSE	<Optional generation of browse product; 1 = browse, 0 = no browse. (Value for operations = 0)>
PSN_PCF_ENG	<Switch for echo of engineering metrics log; 0 = no log, 1 = echo log. (Value for operations = 0)>
PSN_PCF_YEARDAY	<Three digit year day ; format = ddd.>
SlizeMBECSDDataGranule value	5.69449
ReprocessingPlanned value	"further update is anticipated"
ReporcessingActual value	"reprocessed"

ParameterName value
ParameterName value for the coarse product
PGE38 Version

mod_prss_infile_luns
mod_prss_outfile_luns

MOD17A3
MOD17A3C
<Version of PGE38 that appears in the
ciList delivered with the code>
<Lun for product to be subsetted>
<Lun for subsetted product>

4.39 Level 4 8-Day Net Photosynthesis CMG (PGE39)

PGE39 performs the L4 8-Day CMG Net Photosynthesis (PSN) processing at MODAPS.

Purpose

PGE39 produces the 8-Day global CMG PSN product (MOD17C2) and the Land QA product (MODLM_QA).

Structure

PGE39 consists of the L4 CMG PSN 8-Day process (MOD_PR17C2) and the Land QA process (MOD_PRLQA).

MODAPS Production

The MODIS Science Team has not yet delivered PGE39.

Production Rules

PGE39 runs after the 8-day tiles of L4 PSN (PGE37) output have been produced in the processing period. The operational scenario is nominally one activation every 8 days. The Period Start of 8 Days Production Rule is required for PGE39. PGE39 will require a “Smart” Start of Year Production Rule at the end of each year.

The required input to PGE39 is the current 8-day PSN tiled composites (MOD17A2). The global MOD17C2 product is generated from all of the available 8-day tiles of MOD17A2. A Minimum Number of Granules, representing the number of 8-day tiles, is specified for MOD17A2 and a time-out is associated for running PGE39 if the minimum requirements are met.

The Production Rules for PGE39 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD17A2	MODIS/Terra Net Photosynthesis 8-Day L4 Global 1km SIN Grid (R) *
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Dynamic Product Output ESDT

MOD17C2	MODIS/Terra Net Photosynthesis 8-Day L4 Global 0.05Deg CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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* MODIS Science team has not yet delivered PGE 39; the minimum number of

files required for production is unavailable.

4.40 Level 3 32-Day Land Cover (PGE40)

PGE40 performs the L3 32-day Land Cover processing at MODAPS.

Purpose

PGE40 produces the L3 32-day Land Cover Database product (MOD12M), the corresponding subsetting product (MOD_SS), and the Land QA product (MODLM_QA).

Structure

PGE40 consists of the L3 32-day Land Cover Database process (MOD_PR12M) and the Land QA process (MOD_PRLQA). PGE40 also runs the Land shared MOD_PRSS.pl script to produce the subsetted products.

MODAPS Production

PGE40 runs in MODAPS Recipe AM1M_L14, which is executed every 32 days upon the availability of the daily land aggregation products and several 8-day and 16-day land products covering the 32-day period, including the required MOD43B4 16-day product. MODAPS runs PGE40 for each of the Land tiles configured in the Data Processing System. Products archived at MODAPS are the 32-day MOD12M Land Cover Database tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS does not export any products from PGE40 to the PDR Server for archive at one of the DAACs.

Production Rules

PGE40 runs after 32 days of the L3 16-day 1 km Vegetation Indices product (MOD13A2 from PGE35), the L3 16-day BRDF/Albedo product (MOD43B1 from PGE23), the L3 16-day Nadir BRDF-Adjusted Reflectance product (MOD43B4 from PGE23), L3 8-day Land Surface Temperature product (MOD11A2 from PGE31), and L3 daily BRDF Texture Database product (MODAGTEX from PGE22) are generated. At least one MOD43B4 granule is required for the processing of each tile of the output MOD12M. The MOD11A2, MOD13A2, MOD43B1, and MODAGTEX granules are optional. The quality of the PGE40 product of L3 monthly land cover is improved greatly if one month of the L3 BRDF Texture Database at 1km (MODAGTEX from PGE22) products and the L3 8-day Land Surface Temperature/Emissivity at 1km (MOD11A2 from PGE31) products are also available.

The operational scenario is nominally 286 activations every 32 days, representing the processing of one land tile per PGE execution. The Period Start of 32 Days Production Rule is required for PGE40. PGE40 will require a "Smart" Start of Year Production Rule at the end of each year. Since the input products to PGE40 are in day mode only, MOD12M is a day-mode product.

PGE40 requires the Latitude/Longitude Tiling Production Rule. To execute PGE40, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use

them. Since PGE40 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

A runtime parameter is passed to PGE40 to indicate that the MOD12M product is to be subsetting and written to MOD_SS files. This runtime parameter contains the logical unit number for the product. A second runtime parameter contains the corresponding logical unit number for the output MOD_SS files. The version of number of PGE40 is also passed to the PGE as a runtime parameter.

The Production Rules for PGE40 are:

- Period Start of 32 Days,
- “Smart” Start of Year,
- Optional Inputs,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MOD35ANC	MODIS/Terra Olson World Ecosystem Maps at 10 Minute and 1km Resolution and Cloud Mask Thresholds Parameter File (Shared Atmosphere ESDT)
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Dynamic Product Input ESDT

MOD11A2	MODIS/Terra Land Surface Temperature/ Emissivity 8-Day L3 Global 1km SIN Grid (O) 0
MOD13A2	MODIS/Terra Vegetation Indices 16-Day L3 Global 1km SIN Grid (O) 0
MOD43B1	MODIS/Terra BRDF/Albedo Model-1 16-Day L3 Global 1km SIN Grid (O) 0
MOD43B4	MODIS/Terra Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 1km SIN Grid (R) 1
MODAGTEX	MODIS/Terra BRDF Texture Database Daily L3 Global 1km SIN Grid (O) 0

Dynamic Product Output ESDT

MOD12M	MODIS/ Terra Land Cover Database 32-Day L3 Global 1km SIN Grid (A _M) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: Land Cover Database 32-Day L3 Global 1km SIN Grid (Filename contains MOD_SS.MOD12M to identify the particular subsetting product.) (I _M) 1+

* One file produced per validation site; maximum of 15 sites allowed.

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance	(I _M)	1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}.>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

PGE40 Version	<Version of PGE40 that appears in the ciList delivered with the code.>
mod_prss_infile_luns	<Lun for product to be subsetted>
mod_prss_outfile_luns	<Lun for subsetted product>
ReprocessingPlanned value	"further update is anticipated"
ReprocessingActual value	"reprocessed"

4.41 Level 3 Yearly Land Cover Type (PGE41)

PGE41 performs the L3 yearly Land Cover Type processing every 96 days at MODAPS.

Purpose

PGE41 produces the L3 yearly Land Cover Type product (MOD12Q1), the corresponding coarse resolution product (MOD12Q1C), the subsetted Land Cover Type product (MOD_SS), and the Land QA product (MODLM_QA).

Structure

PGE41 consists of the L3 land cover process (MOD_PR12Q), that updates the yearly Land Cover Type Product every 96 days, and the Land QA process (MOD_PRLQA). PGE41 also runs the Land shared MOD_PRSS.pl script to produce subsetted products.

MODAPS Production

PGE41 runs in MODAPS Recipe AM1M_L18, which is executed every 96 days upon the availability of Land Cover Database files to update the existing MOD12Q1 yearly product. MODAPS runs PGE41 for each of the Land tiles configured in the Data Processing System. Products archived at MODAPS are the yearly MOD12Q1 Land Cover Type tiled granules and the corresponding coarse resolution MOD12Q1C tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD12Q1 to the PDR Server for archive and distribution at the LP DAAC.

Production Rules

PGE41 runs when Boston University delivers a new set of Land Cover Database files to MODAPS to update the existing MOD12Q1 yearly product. The operational scenario is nominally 317 activations every 96 days, representing the processing of one land tile per PGE execution. The Period Start of 96 Days Production Rule is required for PGE41. For each tile run, the previous yearly land cover product from MOD_PR12Q is acquired using the Advanced Temporal Production Rule. PGE41 will require a "Smart" Start of Year Production Rule at the end of each year.

PGE41 requires the Latitude/Longitude Tiling Production Rule. To execute PGE41, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. Since PGE41 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter.

The required input products are the updated Land Cover Database files and the existing MOD12Q1, which have been generated only in day mode. Thus, the output products MOD12Q1 and MOD12Q1C are produced only in day mode.

For the first quarter of the mission, MOD12Q1 was not available. The University of Maryland MODIS Group generated a L3 quarterly Land Cover product in the same

format as the MOD12Q1 to be used to provide the land cover information during the first three months of the mission. The source of data for the land cover product was other satellite data. Now Boston University delivers updated Land Cover Database files, including MODIS data, every quarter for input to PGE41.

A runtime parameter is passed to PGE 41 to indicate that the MOD12Q1 product is to be subsetting and written to MOD_SS files. This runtime parameter contains the logical unit number for the product. A second runtime parameter contains the corresponding logical unit number for the output MOD_SS files. The version number of PGE41 is also passed to the PGE as a runtime parameter.

The Production Rules for PGE41 are:

- Period Start of 96 Days,
- “Smart” Start of Year,
- Advanced Temporal,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MOD12LUT	MODIS/Terra LUTs for Production of MOD12Q1 Products (Land Cover Databases)
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Dynamic Product Input ESDT

MOD12Q1	MODIS/Terra Land Cover Type Yearly L3 Global 1km SIN Grid (Previous) (R) 1
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Dynamic Product Output ESDT

MOD12Q1	MODIS/Terra Land Cover Type Yearly L3 Global 1km SIN Grid (A _M) (A _D) 1
MOD12Q1C	MODIS/Terra Coarse Land Cover Type Yearly L3 Global 5km SIN Grid (A _M) 1
MOD_SS	MODIS/Terra Land Subsetting QA File: Land Cover Type Yearly L3 Global 1km SIN Grid (Filename contains MOD_SS.MOD12Q1 to identify the particular subsetting product.) (I _M) 1 ⁺

⁺ One file produced per validation site; maximum of 15 sites allowed.

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS Land Quality Assurance (I _M) 2
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}.>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

PGE41 Version	<Version of PGE41 that appears in the ciList delivered with the code.>
ReprocessingPlanned value	"further update is anticipated"
ReprocessingActual value	"reprocessed"
mod_press_infile_luns	<Lun number for product to be subsetted.>
mod_prss_outfile_luns	<Lun number for subsetted product.>

4.42 Level 3 Yearly Land Cover Type CMG (PGE42)

PGE42 performs the L3 Yearly CMG Land Cover Type processing every 96 days at MODAPS.

Purpose

PGE42 produces the L3 global Yearly CMG Land Cover product (MOD12C1) and the Land QA product (MODLM_QA).

Structure

PGE42 consists of the L3 Yearly CMG Land Cover process (MOD_PR12C) and the Land QA process (MOD_PRLQA).

MODAPS Production

PGE42 runs in MODAPS Recipe AM1M_L19, which is executed every 96 days upon the delivery of Land Cover Database files to update the MOD12C1 yearly product. The product archived at MODAPS is the yearly MOD12C1 global CMG map. The MODAPS Interim Product is MODLM_QA. MODAPS exports MOD12C1 to the PDR Server for archive and distribution at the LP DAAC.

Production Rules

PGE42 runs when Boston University delivers a new set of Land Cover Database files to MODAPS to update the existing MOD12C1 yearly product. The operational scenario is 1 activation every 96 days. The Period Start of 96 Days Production Rule is required for PGE42. PGE42 will require a "Smart" Start of Year Production Rule at the end of each year.

The required inputs are the updated Land Cover Database files from Boston University, which have been generated only in day mode. Thus, the output product MOD12C1 is produced only in day mode. These tiled database files are delivered as static files that PGE41 packages into MOD12Q1 ESDT collections at MODAPS. The version number of PGE42 and other parameters are passed to the PGE as runtime parameters.

The basic Production Rules for PGE42 are:

- Period Start of 96 Days,
- "Smart" Start of Year,
- Advanced Temporal,
- Runtime Parameters.

Data Files**Static Input ESDT**

MOD12LCD	MODIS/Terra Land Cover Databases for Production of MOD12C Products
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Dynamic Product Input ESDT

MOD12Q1	MODIS/Terra Land Cover Type Yearly L3 Global 1km SIN Grid (Currently these tiles are still static files from MOD12LCD above) (R) 1
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Dynamic Product Output ESDT

MOD12C1	MODIS/Terra Land Cover Type Yearly L3 Global 0.05Deg CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}.>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

PGE42 Version	<Version of PGE42 that appears in the ciList delivered with the code.>
ReprocessingPlanned value	"further update is anticipated"
ReprocessingActual value	"reprocessed"

4.43 Level 3 Daily Snow Cover (PGE43)

PGE43 performs the L3 daily Snow Cover processing at MODAPS.

Purpose

PGE43 produces the L3 daily Snow Cover product (MOD10A1) and the corresponding subsetted product (MOD_SS). It also produces the Land QA product (MODLM_QA) and the BROWSE product.

Structure

PGE43 consists of the L3 daily Snow Cover process (MOD_PR10A1) and the Land QA process (MOD_PRLQA). PGE43 also runs the Land shared MOD_PRSS.pl script to produce the subsetted product and runs the BROWSE (MOD_PRbrowse).

MODAPS Production

PGE43 runs in MODAPS Recipe AM1M_L5, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE43 for each of the Land tiles configured in its Data Processing System for Snow Cover products upon the availability of the L2G Snow Cover granules (MOD10L2G) from PGE14, L2G pointers (MODPTHKM) from PGE12, and geolocation angles (MODMGGAD) from PGE12. Products archived at MODAPS are the daily Snow Cover (MOD10A1) tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD10A1 to the PDR Server for archive and distribution at the NSIDC DAAC. PGE43 also produces a BROWSE product and exports it to the NSIDC DAAC.

Production Rules

PGE43 runs after a full day of L2G Snow Cover (PGE14) processing has completed and the MOD10L2G products have been generated. Out of a total number of Land tiles defined over the surface of the Earth in the Sinusoidal Grid, PGE43 generates products for 317 tiles. The MODAPS Loader for PGE43 selects the tiles to be processed. The required input product is MOD10L2G, which has been generated only in day mode. Thus, the output product MOD10A1 is produced only in day mode. The operational scenario is 317 activations per day, representing the processing of one Land tile per PGE execution. The Period Specification of one day is required for PGE43.

PGE43 requires the Latitude/Longitude Tiling Production Rule. To execute PGE43, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. Since PGE43 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter for use by the PGE. The tiling schemes used to produce the input product of L2G Snow Cover (MOD10L2G) and 500m resolution Pointers are shown in Table 3-9.

The current plans include processing L3 daily snow cover between 30 to 90 degrees North for Northern Hemisphere for the entire year and other selected areas for either all

or part of the year. In the Southern Hemisphere the processing of daily snow cover is primarily done for Antarctica, which extends from 60 to 90 degrees South, for every day of the year and for other selected regions. The tiling schemes under which the Snow Cover products are generated will accomplish the geographical selection.

MODAPS passes a dynamic runtime parameter to PGE43 to indicate the spacecraft platform for the MODIS Instrument. The value is either "AM1M" or "PM1M". A static runtime parameter is passed to PGE43 to indicate that the MOD10A1 product is to be subsetting and written to MOD_SS files. This runtime parameter contains the logical unit number for the product. A second static runtime parameter contains the corresponding logical unit numbers for the output MOD_SS files. The version number of PGE43 is also passed to the PGE as a runtime parameter.

The Production Rules for PGE43 are:

- Period Specification,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MOD10LUT	MODIS/Terra LUTs for Production of MOD10A1 Products
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Dynamic Input ESDT

MOD10L2G	MODIS/Terra Snow Cover Daily L2G Global 500m SIN Grid (R) 1
MODMGGAD	MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid (R) 1
MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m SIN Grid (R) 1
MOD12Q1	MODIS/Terra Land Cover Type Yearly L3 Global 1km SIN Grid (R) 1
MOD09GHK	MODIS/Terra Surface Reflectance Daily L2G Global 500m SIN Grid (O) 0

Dynamic Product Output ESDT

MOD10A1	MODIS/Terra Snow Cover Daily L3 Global 500m SIN Grid (A _M) (A _D) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: Snow Cover Daily L3 Global 500m SIN Grid (Filename contains

MOD_SS.MOD10A1 to identify the particular
subsetted product.) (I_M) 1⁺

BROWSE MODIS/Terra Browse Products (A_M) (A_D) 1

⁺ One file produced per validation site; maximum of 15 sites allowed.

Quality Control or Diagnostic Output ESDT

MODLM_QA MODIS/Terra Land Quality Assurance (I_M) 1

Dynamic Runtime Parameter for Operations

SatelliteInstrument <Spacecraft platform for MODIS Instrument supplied
by MODAPS. Value = {AM1M, PM1M}>

ProcessingEnvironment <Computer platform on which PGE is run; determined
by the PGE perl script.>

Static Runtime Parameters for Operations

mod_prss_infile_luns	<Lun for product to be subsetted.>
mod_prss_outfile_luns	<Lun for subsetted product.>
PGE43 Version	<Version of PGE43 that appears in ciList delivered with the code>
Reprocessing Planned	"further update is anticipated"
Reprocessing Actual	"reprocessed"

4.44 Level 3 Daily Sea Ice Extent (PGE44)

PGE44 performs the L3 daily Sea Ice Extent processing at MODAPS.

Purpose

PGE44 produces the L3 daily Sea Ice Extent product (MOD29P1D and MOD29P1N for day and night mode, respectively), BROWSE products, and the Land QA product (MODLM_QA).

Structure

PGE44 consists of the L3 Daily Sea Ice Extent process (MOD_PR29A1) and the Land QA process (MOD_PRLQA). PGE44 also runs the Land shared MOD_PRSS.pl Script to produce the subsetted products and runs the BROWSE (MOD_PRbrowse).

MODAPS Production

PGE44 runs in MODAPS Recipe AM1M_L5P, which is executed every day upon the availability of MOD03 granules covering the daily processing period. MODAPS runs PGE44 for each of the Land tiles configured in its Data Processing System for Sea Ice Extent products upon the availability of L2G Sea Ice granules (MOD29PGD and MOD29PGN) in Day and Night mode from PGE15, L2G pointers (MODPTPGD and MODPTPGN) from PGE12, and L2G geolocation angles (MODMGPGD) from PGE12. Products archived at MODAPS are the daily Sea Ice Extent (MOD29P1D and MOD29P1N) tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD29P1D and MOD29P1N to the PDR Server for archive and distribution at the NSIDC DAAC. PGE44 also produces BROWSE products and exports them to the NSIDC DAAC.

Production Rules

PGE44 runs after a full day of L2G Sea Ice (PGE15) processing has completed and produced the MOD29PGD and MOD29PGN products. These input products are produced in the EASE Grid, Lambert polar projection. Out of a total number of Land tiles defined over the surface of the Earth in the EASE Grid, PGE44 generates products for 210 tiles. The MODAPS Loader for PGE44 selects the tiles to be processed. The operational scenario is nominally 210 activations per day for day mode data and 210 activations for night mode data, representing the processing of one sea-ice tile per PGE execution. The Period Specification of one day is required for PGE44.

PGE44 requires the Latitude/Longitude Tiling Production Rule. To execute PGE44, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. The Sea Ice products are currently being generated in the polar projection EASE Grid. A separate tile scheme is configured in MODAPS for the EASE Grid tiles. This tile scheme is used in the Recipes containing the Sea Ice PGEs. The TileIDs are different for the EASE Grid than the SIN Grid tiles used for other Land Products. PGE 44 has

retained the capability of producing SIN Grid products as it did in previous versions. The TileID in the input granule tells the PGE whether to generate polar EASE-Grid products or the SIN Grid Products. Since PGE44 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a runtime parameter for use by the PGE.

The tiling scheme used to produce the L2G input products of MOD29PGD and MOD29PGN. Is shown in Table 3-9. Since there is a separation of day and night mode data and a switch for the run-type of day or night is passed to the PGE script, two profiles of PGE44 are required.

The required input is MOD29PGD or MOD29PGN, which have been generated separately in day mode and night mode. Thus, the MOD29P1D and MOD29P1N output products are produced separately in day mode and night mode. MOD29P1D and MOD29P1N are to be produced for all of the tiles of data located in the area of 40 to 90 degrees north latitude for the Northern Hemisphere and 50 to 90 degrees south latitude for the Southern Hemisphere for every day of the year. The tiles that encompass only land are excluded. The tiling schemes under which the Sea Ice products were generated will accomplish the geographical selection.

MODAPS passes a dynamic runtime parameter to PGE44 to indicate the Spacecraft platform for the MODIS instrument. The value is either "AM1M" or PM1M" MODAPS also passes the RunType parameter to PGE44 to indicate whether "Day" or "Night" products are to be generated.

A static runtime parameter is passed to PGE44 to indicate that the MOD29PID and MOD29PIN products are to be subsetting and written to MOD_SS files. The runtime parameter contains the logical unit number for the product. A second static runtime parameter contains the corresponding logical unit numbers for the output MOD_SS files. The version number of PGE44 is also passed to the PGE as a runtime parameter.

The Production Rules for PGE44 are:

- Period Specification,
- Metadata Based Query,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD29PGD	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Day (R) 1
MOD29PGN	MODIS/Terra Sea Ice Extent Daily L2G Global 1km EASE-Grid Night (R) 1
MODPTPGD	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Day (R) 1

MODPTPGN	MODIS/Terra Observation Pointers Daily L2G Global 1km EASE-Grid Night (R) 1
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MODMGPGD	MODIS/Terra Geolocation Angles Daily L2G Global 1km EASE-Grid Day (R) 1
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Dynamic Product Output ESDT

MOD29P1D	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Day (A _M) (A _D) 1
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MOD29P1N	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Night (A _M) (A _D) 1
----------	---

MOD_SS	MODIS/Terra Land Subsetting QA Files: Sea Ice Extent Daily L3 Global 1km EASE-Grid Day (Filename contains MOD_SS.MOD29P1D to identify the particular subsetted product.) (I _M) 1+
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MOD_SS	MODIS/Terra Land Subsetting QA Files: Sea Ice Extent Daily L3 Global 1km EASE-Grid Night (Filename contains MOD_SS.MOD29P1N to identify the particular subsetted product.) (I _M) 1+
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BROWSE	MODIS/Terra Browse Products (A _M) (A _D) 2
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+ One file produced per validation site; maximum of 15 sites allowed.

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameter for Operations

RunType	<Switch to indicate whether Day or Night products are to be generated. Values = {Day, Night}>
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SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
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ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>
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Static Runtime Parameters for Operations

mod_prss_infile_luns	<Lun for product to be subsetted.>
mod_prss_outfile_luns	<Lun for subsetted product.>
PGE44 Version	<Version of PGE44 that appears in ciList delivered with the code.>
REPROCESSINGPLANNED	"further update is anticipated"
REPROCESSINGACTUAL	"reprocessed"

4.45 Level 3 8-Day Snow Cover (PGE45)

PGE 45 performs the L3 8-day Snow Cover processing at MODAPS.

Purpose

PGE45 produces the L3 8-day Snow Cover product (MOD10A2) and the corresponding subsetting product (MOD_SS). It also produces a BROWSE product and the Land QA product (MODLM_QA).

Structure

PGE45 consists of the 8-day Snow Cover process (MOD_PR10A2) and the Land QA process (MOD_PRLQA). PGE 45 also runs the Land shared MOD_PRSS.pl script to produce the subsetting product and runs BROWSE (MOD_PRbrowse).

MODAPS Production

PGE45 runs in MODAPS Recipe AM1M_L10, which is executed every 8 days upon the availability of all required input daily Land products covering the 8-Day processing period. MODAPS runs PGE45 for each of the Land tiles configured in the Data Processing System after the required daily snow products are generated. Products archived at MODAPS are the 8-Day Snow Cover product (MOD10A2) tiled granules. MODAPS Interim products are MOD_SS and MODLM_QA. MODAPS exports MOD10A2 to the PDR Server for archive and distribution at the NSIDC DAAC. PGE45 also produces a BROWSE product and exports it to the NSIDC DAAC.

Production Rules

PGE45 runs after eight days of L3 daily Snow Cover (PGE43) processing has completed. Out of a total number of Land tiles defined over the surface of the Earth in the Sinusoidal Grid, PGE45 generates products for 317 tiles. The MODAPS Loader for PGE45 selects the tiles to be processed. The operational scenario is 317 activations every 8 days, representing the processing of one land tile per PGE execution. The Period Start of 8 Days Production Rule is required for PGE 45. PGE45 will require a "Smart" Start of Year Production Rule at the end of each year. The required input is MOD10A1 which has been generated only in day mode. Thus, the output product MOD10A2 is produced only in day mode.

PGE45 requires the Latitude/Longitude Tiling Production Rule. To execute PGE45, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. Since PGE45 now obtains the TileID from the input products, MODAPS does not need to set the TileID as a dynamic runtime parameter for use by the PGE.

The current plans include processing snow cover between 30 to 90 degrees north for Northern Hemisphere for the entire year and other selected areas for either all or part of the year. In the Southern Hemisphere the processing of daily snow cover is primarily

done for Antarctica, which extends from 60 to 90 degrees south, for every day of the year and for other selected regions. The tiling schemes under which the Snow Cover products are generated will accomplish the geographical selection.

MODAPS passes a dynamic runtime parameter to PGE45 to indicate the spacecraft platform for the MODIS Instrument. The value is either "AM1M" or "PM1M". In addition it passes the dynamic runtime parameters for the start date and time for data observations and end date and time for data observations.

A static runtime parameter is passed to PGE45 to indicate that the MOD10A2 product is to be subsetted and written to MOD_SS files. The runtime parameter contains the logical unit number for the product. A second static runtime parameter contains the corresponding logical unit numbers for the output MOD_SS files. The version number of PGE45 is also passed to the PGE as a runtime parameter.

The Production Rules for PGE45 are:

- Period Start of 8 Days,
- "Smart" Start of Year
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD10A1	MODIS/Terra Snow Cover Daily L3 Global 500m SIN Grid (R) 2
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Dynamic Product Output ESDT

MOD10A2	MODIS/Terra Snow Cover 8-Day L3 Global 500m SIN Grid (A _M) ((A _D) 1
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MOD_SS	MODIS/Terra Subsetting QA Files: Snow Cover 8-Day L3 Global 500m SIN Grid (Filename contains MOD_SS.MOD10A2 to identify the particular subsetted product.) (I _M) 1+
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BROWSE	MODIS/Terra Browse Products (A _M) (A _D) 1
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+ One file produced per validation site; maximum of 15 sites allowed.

Quality control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameter for Operations

Start date time	<Start date and time for data observations>
End date time	<End date and time for data observations>

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameter for Operations

mod_prss_infile_luns	<Lun for product to be subsetted.>
mod_prss_outfile_luns	<Lun for subsetted product.>
PGE45 Version	<Version of PGE45 that appears in ciList delivered with the code.>
REPROCESSING_PLANNED	"further update is anticipated"
REPROCESSING_ACTUAL	"reprocessed"

4.46 Level 3 Daily Snow Cover CMG (PGE46)

PGE46 performs the daily CMG Snow Cover processing at MODAPS.

Purpose

PGE46 produces the L3 global Daily Snow Cover CMG product (MOD10C1) and the Land QA product (MODLM_QA).

Structure

PGE46 consists of the daily CMG Snow Cover process (MOD_PR10C1) and the Land QA process (MOD_PRLQA).

MODAPS Production

PGE46 runs in MODAPS Recipe AM1M_L9, which is executed every day upon the availability of all required Land tiled granules covering the daily processing period and required for daily CMG products. MODAPS runs PGE46 System after all of the daily Snow Cover Land tiles are generated for input. Products archived at MODAPS are granules of the daily Snow Cover CMG product, MOD10C1. MODAPS Interim products are MODLM_QA files. MODAPS exports MOD10C1 to the PDR Server for archive and distribution at the NSIDC DAAC.

Production Rules

PGE46 runs after one day of L3 Snow Cover (PGE43) processing has been produced. The operational scenario is nominally one activation every day. The Period Specification Production Rule is required for PGE46.

The required input is MOD10A1 which has been generated only in day mode. Thus, the output product MOD10C1 is produced only in day mode. The global MOD10C1 product is generated from all of the available daily tiles of L3 Snow Cover product. A Minimum Number of Granules, representing the number of daily tiles, is specified for MOD10A1 and a time-out is associated for running PGE46 if the minimum requirements are met.

The Production Rules for PGE46 are:

- Period Specification,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MOD10LUC

MODISTerra LUTs for Production of MOD10C Products

Dynamic Product Input ESDT

MOD10A1	MODIS/Terra Snow Cover Daily L3 Global 500m SIN Grid (R) 1
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Dynamic Product Output ESDT

MOD10C1	MODIS/Terra Snow Cover Daily L3 Global 0.05Deg CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

PGE46 Version	<Version of PGE46 that appears in ciList delivered with the code>
REPROCESSING_PLANNED	"further update is anticipated"
REPROCESSING_ACTUAL	"reprocessed"

4.47 Level 3 8-Day Sea Ice Extent (PGE47)

PGE47 performs the L3 8-day Sea Ice Extent processing at MODAPS.

Purpose

PGE47 produces the L3 8-day global Sea Ice Extent products (MOD29P2D and MOD29P2N) and the Land QA product (MODLM_QA).

Structure

PGE47 consists of the L3 8-day Sea Ice Extent process (MOD_PR29A2) and the Land QA process (MOD_PRLQA).

MODAPS Production

The MODIS Science Team has not yet delivered PGE47.

Production Rules

PGE47 runs after 8 days of L3 daily Sea Ice Extent (PGE44) has completed. The operational scenario is one activation per tile every 8 days, representing the production of one 8-day land tile per PGE execution. The Period Start of 8 Days Production Rule is required for PGE47. PGE47 will require a "Smart" Start of Year Production Rule at the end of each year.

PGE47 requires the Latitude/Longitude Tiling Production Rule. To execute PGE47, a Latitude/Longitude tile definition file must be associated with the PGE. The Sea Ice products are currently being generated in the polar projection EASE-Grid. A separate tile scheme is configured in MODAPS for the EASE-Grid tiles. The TileIDs are different for the EASE-Grid from the SIN Grid used for other Land products. PGE47 has retained the capability of producing SIN Grid products as it did in previous versions. The TileID in the input granule tells PGE47 whether to generate polar EASE-Grid products or the SIN Grid products.

The required inputs are MOD29P1D and MOD29P1N, which have been generated separately in day mode and night mode. Thus, the output products MOD29P2D and MOD29P2N are produced separately in day mode and night mode. Since there is a separation of day and night mode data, two profiles of PGE47 are required. A switch for TILEMODE of Day or Night is passed to the PGE script.

MODAPS V2 passes a dynamic runtime parameter to PGE47 to indicate the spacecraft platform for the MODIS Instrument. The value is either "AM1M" or "PM1M". MODAPS also passes the TILEMODE parameter to PGE47 to indicate whether "Day" or "Night" products are to be generated. The version number of PGE47 is also passed to the PGE as a runtime parameter.

The Production Rules for PGE47 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Metadata Based Query,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD29P1D	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Day (R)*
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MOD29P1N	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Night (R)*
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Dynamic Product Output ESDT

MOD29P2D	MODIS/Terra Sea Ice Extent 8-Day L3 Global 1km EASE-Grid Day (A _M) (A _D) 1
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MOD29P2N	MODIS/Terra Sea Ice Extent 8-Day L3 Global 1km EASE-Grid Night (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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*The MODIS Science Team has not yet delivered PGE47; the minimum number of files required is unavailable.

Dynamic Runtime Parameters **

TILEMODE	<Switch to indicate whether Day or Night products are to be generated. Values = {Day, night}>
TileID	<Tile identification number (value = 8-digit integer that specifies the specific tile within the current requested tile scheme)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters **

PGE47 Version

<Version of PGE47 that appears in ciList delivered
with the code>

- **** The MODIS Science Team has not yet delivered PGE47; the dynamic and static runtime parameters may not be complete.

4.48 Level 3 Daily Sea Ice Extent CMG (PGE48)

PGE48 performs the daily CMG Sea Ice Extent processing executed at MODAPS.

Purpose

PGE48 produces the L3 daily global Sea Ice Extent CMG products (MOD29C1D and MOD29C1N) and the Land QA product (MODLM_QA).

Structure

PGE48 consists of the daily CMG Sea Ice Extent process (MOD_PR29C1) and the Land QA process (MOD_PRLQA).

MODAPS Production

The MODIS Science Team has not yet delivered PGE48.

Production Rules

PGE48 runs after one day of L3 Sea Ice Extent daily (PGE44) output has been produced. The operational scenario is nominally one activation per day. The Period Specification Production Rule is required for PGE48.

The required inputs are MOD29P1D and MOD29P1N which have been generated separately in day mode and night mode. Thus, the output products MOD29C1D and MOD29C1N are produced separately in day mode and night mode. Two profiles of PGE48 must be configured in MODAPS, one for day mode and one for night mode. The global MOD29C1D and MOD29C1N products are generated from all of the available daily tiles of L3 Sea Ice Extent product. A Minimum Number of Granules, representing the number of daily tiles, is specified for MOD29P1D and MOD29P1N and a time-out is associated for running PGE48 if the minimum requirements are met.

The Production Rules for PGE48 are:

- Period Specification,
- Metadata Based Query,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD29P1D	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Day (R) *
MOD29P1N	MODIS/Terra Sea Ice Extent Daily L3 Global 1km EASE-Grid Night (R) *

Dynamic Product Output ESDT

MOD29C1D	MODIS/Terra Sea Ice Extent Daily L3 Global 0.05Deg CMG Day (A _M) (A _D) 1
MOD29C1N	MODIS/Terra Sea Ice Extent Daily L3 Global 0.05Deg CMG Night (A _M) (A _D) 1

* MODIS Science Team has not yet delivered PGE48; the minimum number of files required for production is unavailable.

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations**

start date time	<Start date and time for date observation>
end date time	<End date and time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameter for Operations**

PGE48 Version	<Version of PGE48 that appears in ciList delivered with the code>
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** MODIS Science Team has not yet delivered PGE48; dynamic and static runtime parameters may not be complete.

4.49 Level 3 8-Day Oceans Interim (PGE49)

PGE49 performs the L3 Oceans Interim 8-Day processing at MODAPS. PGE49 is not currently running in MODAPS Operations. It is being maintained for possible use in the future.

Purpose

PGE49 produces L3 Oceans Interim 8-Day products. The two types of products are 8-Day composites of Ocean Color for 36 parameters and 8-Day composites of Sea Surface Temperature (SST) for two parameters. The products for both SST parameters are produced in nighttime but only one SST parameter is produced in daytime.

Structure

PGE49 consists of the Ocean Time Binning process (MOD_PRmtbin).

MODAPS Production

PGE49 is run in MODAPS Recipe AM1M_O3a, which is executed every 8-days upon the availability of the Oceans Interim daily MODOCA_{nn} (where nn = parameters 1...36) and MOD28A_{mm} (where mm = parameters D1, N1, N2) granules covering the processing period. Products archived at MODAPS are the Oceans Interim 8-Day MODOCE_{nn} (where nn = parameters 1...36), and MOD28E_{mm} (where mm = parameters D1, N1, N2). There are no exported products to the GSFC DAAC from PGE49. All of the products are MODAPS Interim products.

Production Rules

PGE49 runs after eight days of L3 Oceans Interim daily (PGE20) processing has been completed. The operational scenario is nominally 39 activations every eight days, representing the processing of one of 36 Ocean Color Parameters or one of two Ocean SST parameters, both in night mode and one in day mode, per PGE execution. The Period Start of 8 Days Production Rule is required for PGE49. PGE49 will require a "Smart" Start of Year Production Rule at the end of each year. The Oceans PGEs also require a specification to override the default of including the few days of the next year in the product made during the last period of the year.

One of the Ocean Color (MODOCA_{nn}) or SST (MOD28A_{mm}) parameter products is required for each PGE execution. Thus, PGE49 must be run 39 times every 8-days. PGE49 requires the Specification of the Data Days to be included, using the special Data Day implementation of the Runtime Parameter Production Rule. For this Production Rule, MODAPS stages the eight input data days for the parameter being processed and passes the start dataday and end dataday to the PGE as Runtime Parameters. A Minimum Number of Granules for the daily required input Oceans product is specified and a time-out is associated for running PGE49 if the minimum requirements are met.

The Production Rules for PGE49 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Data Day
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MODOCTB

MODIS/Terra Ocean Time Binner Parameters

Dynamic Product Input ESDT

One of the following for each PGE profile activation:

MODOCA_{nn} MODIS/Terra Ocean Color Time-Binned Interim
Params 1-36 Daily L3 Global 4km ISEAG (where nn =
parameters 1-36) (R) 1*

MOD28A_{mm} MODIS/Terra Sea Surface Temperature Time-Binned
Interim Params Daily L3 Global 4km ISEAG (where
mm = parameters D1, N1, N2) (R) 1*

Dynamic Product Output ESDT

One of the following for each PGE profile activation:

MODOCE_{nn} MODIS/Terra Ocean Color Interim Composite Params
1-36 8-Day L3 Global 4km ISEAG (where nn =
parameters 1-36) (A_M) 1*

MOD28E_{mm} MODIS/Terra Sea Surface Temperature Interim
Composite Params 8-Day L3 Global 4km ISEAG
(where mm = parameters D1, N1, N2) (A_M) 1*

*Per parameter

Dynamic Runtime Parameters for Operations

start dataday	<Start Day for Data Observations (yyyyddd)>
end dataday	<End Day for Data Observations (yyyyddd)>
band to map	<Parameter name>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	0
time flag	W
output quality	M
gsfc quality	1
longitude, origin	0.0
latitude, origin	0.0
projection rotation	0.0
longitude, center	0.0
latitude, center	0.0
output image width in degree	0.0
output image height in degrees	180.0
equa	0
name	<Parameter name>
units	<Parameter units>
slope	1.0
intcp	0.0
scale	0
bias	0
which quality field	D
profile	27
PGE Version	<Version of PGE49 that appears in the ciList delivered with the code>

4.50 Level 3 24-Day Oceans Reference (PGE50)

PGE50 performs the L3 Ocean 24-Day (3-Week) Reference processing at MODAPS. PGE50 is not currently running in MODAPS Operations. It is being maintained for possible use in the future.

Purpose

PGE50 produces the L3 Ocean 24-Day Reference products (one per PGE execution): Ocean Color MODOCR_{nn} (where nn = 1...36), and Sea Surface Temperature (SST) MOD28R_{mm} (where mm = D1, N1, N2). The 24-day reference file is updated every 8 days and is used as a running reference covering the 24-day period.

Structure

PGE50 consists of the L3 Ocean 24-Day Running (3-Week) Reference processes (MOD_PRmtbin and MOD_PRmfill). Figure 4-8 shows the structure of PGE50.

MODAPS Production

PGE50 is run in MODAPS Recipe AM1M_O3b, which is executed every 8 days upon completion of the three consecutive Oceans Interim 8-Day MODOCE_{nn} (where nn = parameters 1...36) and MOD28E_{mm} (where mm = parameters D1, N1, N2) granules covering the processing period. Products archived at MODAPS are the 24-Day Reference products, MODOCR_{nn} (where nn = parameters 1...36) and MOD28R_{mm} (where mm = parameters D1, N1, N2). The middle week (8 days) of the 24-Day Reference file matches the 8-day processing period for the current Oceans products. This middle week reference file is always produced 8 days behind the current Oceans Interim 8-day product. There are currently no exported products from PGE50. All of the above products are MODAPS Interim products. However, in the future the MODOCR_{nn} and MOD28R_{mm} may be archived at the GSFC DAAC. PGE50 also produces temporary files of MODOCF_{nn} and MOD28F_{mm}, which are deleted at the completion of the PGE run.

Production Rules

PGE50 runs after three sequential L3 Oceans Interim 8-day (PGE49) output products are completed. The middle 8-day week of the sequence is the processing period. The operational scenario is nominally 39 activations every 8 days, representing the processing of one of 36 Ocean Color Parameters or one of the Ocean SST parameters in either the day or night mode per PGE execution. The Period Start of 8 Days Production Rule is required for PGE50 to generate the L3 Oceans 24-day Reference products. PGE50 will require a "Smart" Start of Year Production Rule at the end of each year. The Oceans PGEs also require specification of an override for the default of including the few days of the next year in the product made during the last period of the year.

The L3 24-day composites of Ocean Color and SST are archived for use in subsequent Ocean processing. The corresponding temporary products are deleted after the PGE run. One of the Ocean Color or SST parameter products (MODOCE_{nn} or MOD28E_{mm}), is required for each PGE execution.

The Advanced Temporal Production Rule is used to specify a negative delta time from the start of the processing period to acquire the previous 8-day L3 Oceans weekly granule. This Production Rule is also used to specify a positive delta time from the end of the processing to acquire the 8-day (weekly) L3 Oceans granule following the processing period. The algorithms for setting the delta times in the start and end of the data processing period for these ancillary data sets are described in Section 5.8, Advanced Temporal Production Rule.

PGE50 requires the Specification of the Data Days to be included, using the special Data Day implementation of the Runtime Parameter Production Rule. For this Production Rule, MODAPS stages the 8-day composites for the parameter being processed and passes the start dataday and end dataday to the PGE as Runtime Parameters. A Minimum Number of Granules, representing the number of input 8-day L3 Oceans weekly granules, is specified for the 24-day product and a time-out is associated for running PGE50 if the minimum requirements are met.

The Production Rules for PGE50 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Data Day,
- Runtime Parameters,
- Advanced Temporal,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MODOCMSK	MODIS/Terra Oceans Processing Land and Shallow Water Masks
MODOCTB	MODIS/Terra Ocean Time Binner Parameters

Dynamic Product Input ESDT

One of the following for each PGE profile activation:

MODOCE _{nn}	MODIS/Terra Ocean Color Interim Composite Params 1-36 8-Day L3 Global 4km ISEAG (where nn = parameters 1-36) (R) 3
MOD28E _{mm}	MODIS/Terra Sea Surface Temperature Interim Composite Params 8-Day L3 Global 4km ISEAG (where mm = parameters D1, N1, N2) (R) 3

Dynamic Product Output ESDT

One of the following for each PGE profile activation:

MODOCR _{nn}	MODIS/Terra Ocean Color Interim Composite Params 1-36 24-Day L3 Global 4km ISEAG (where nn = Parameters 1-36) (A _M) 1
MOD28R _{mm}	MODIS/Terra Sea Surface Temperature Interim Composite Params 24-Day L3 Global 4km ISEAG (where mm = parameters D1, N1, N2) (A _M) 1

Temporary Output Files

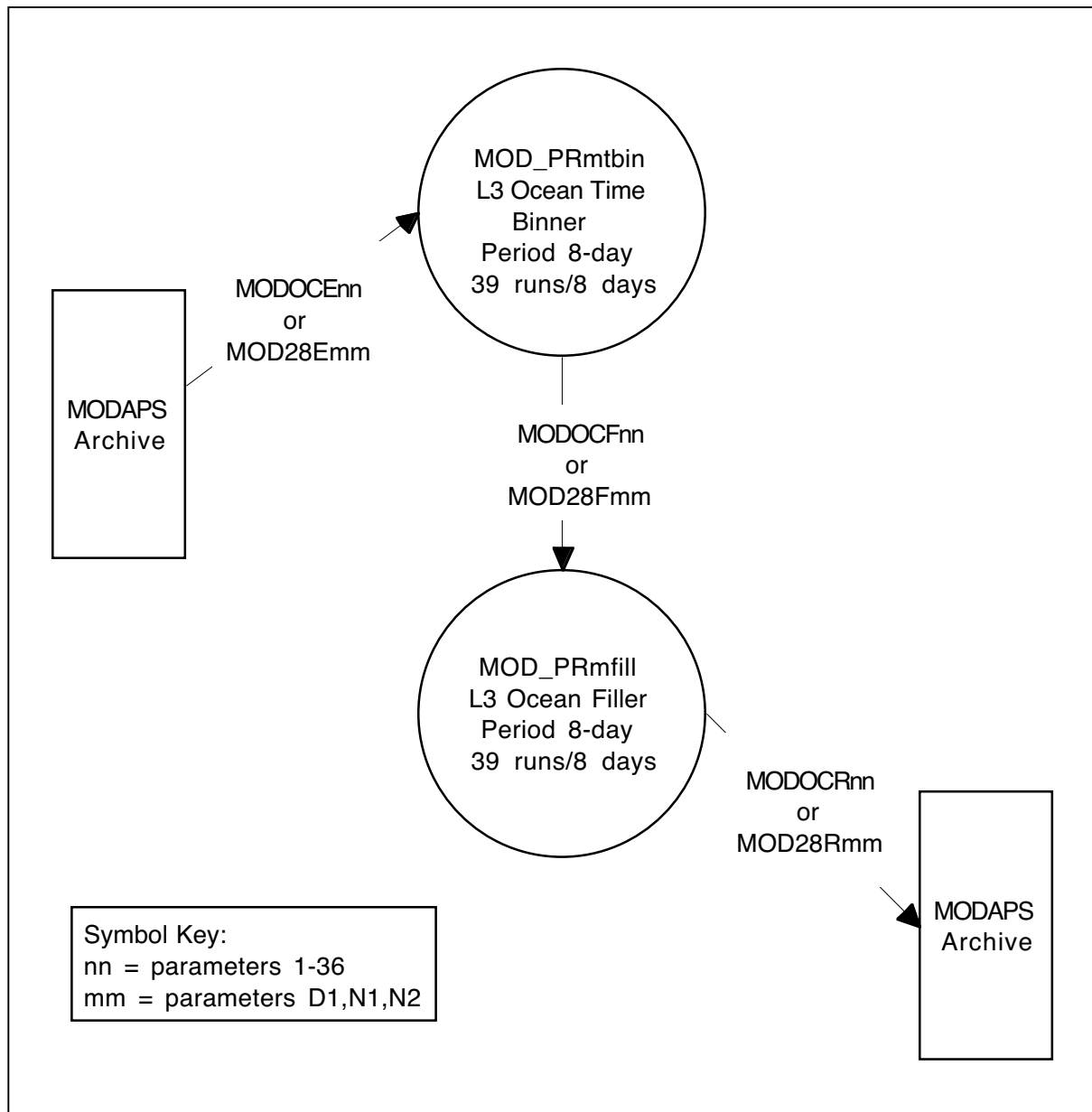
MODOCF _{nn}	MODIS/Terra Ocean Color Temporary Composite Params 1-36 24-Day L3 Global 4km ISEAG (where nn = parameters 1-36) (T _M) 1
MOD28F _{mm}	MODIS/Terra Sea Surface Temperature Temporary Composite Params 24-Day L3 Global 4km ISEAG (where mm = parameters D1, N1, N2) (T _M) 1

Dynamic Runtime Parameter for Operations

start dataday	<Start Day for Data Observations(yyyyddd)>
end dataday	<End Day for Data Observations(yyyyddd)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>
Param Name	<Name of parameter to process>

Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	0
boxsiz	7
wq	B
iter	100
qual	A
time flag	R
PGE Version	<Version of PGE50 that appears in the ciList delivered with the code>

**Figure 4-8 PGE50 Structure**

4.51 Level 4 8-Day and Running Yearly Oceans Productivity Indices (PGE51)

PGE51 is the L4 Ocean 8-Day (Weekly) and Running Yearly Productivity Indices PGE processing at MODAPS. The running yearly product is planned for the future.

Purpose

PGE51 produces the L4 8-day (weekly) and running annual Ocean Productivity Indices products (MOD27W and MOD27Y) and corresponding L4 8-day (weekly) (MOAPWA, MOAPWB, MOAPW1) maps and L4 yearly (MOAPYA, MOAPYB, MOAPY1) maps.

Structure

PGE51 consists of the L3 ocean 8-day (weekly) Productivity Indices and yearly Productivity Indices processes (MOD_PRWK and MOD_PRYR). Figure 4-9 shows the structure of PGE51.

MODAPS Production

PGE51 is run in MODAPS Recipe AM1M_O5, which is executed every 8 days upon the availability of MODOCW₂₇ and MOD28W_{D1} granules covering the processing period. Optional inputs to the 8-day processing are 1 to 8 daily files of D4LAXMNT and 1 to 8 daily files of FNMOC_ML within the processing period. When these data are unavailable, PGE51 uses the following climatological data: MLD Climatology and PAR/radswg Climatology. Products archived at MODAPS for the 8-day period are granules of MOD27W, MOAPWA, MOAPWB, and MOAPW1. The MOAPWA, MOAPWB, and MOAPW1 map products consist of 8 parameter files each. MODAPS exports the MOD27W, MOAPWA, MOAPWB, and MOAPW1 to the PDR Server for archive and distribution at the GES DAAC. In the future, PGE51 will also run once a week using the current plus 45 previous MOD27W 8-day granules to make the running yearly product. Products archived at MODAPS for the yearly period are granules of MOD27Y, MOAPYA, MOAPYB, and MOAPY1. The MOAPYA, MOAPYB, and MOAPY1 map products consist of 10 parameter files each. MODAPS exports the MOD27Y, MOAPYA, MOAPYB and MOAPY1 to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

PGE51 runs after the ocean color and SST 8-day files are produced by L3 Ocean Weekly (8-Day) PGE54. PGE51 is activated once every 8 days to produce the weekly and running yearly products. MODOCW₂₇ and MOD28W_{D1} are required inputs to MOD_PRWK. If MODOCW₂₇ is available but not MOD28W_{D1}, after a wait period of two days PGE51 is run without it.

There are two optional ancillary input data sets: FNMOC_ML with eight daily files and D4LAXMNT with eight daily files for each of the eight days of the processing period. The algorithms for setting the delta time in the start and end of the data processing period for these ancillary data sets are described in Section 5.8, Advanced Temporal Production Rule. A Minimum Number of Granules is to be set for each ancillary data

type. If the ancillary data are not available, PGE runs without them and uses the climatological files in MOD27LUT. For the MOD_PRWK process, the start and end data days for the processing period need to be specified using the Ocean Data Day Production Rule which is a special implementation of the Runtime Parameter Production Rule. For this Production Rule, MODAPS stages all of the input granules within the start and end data days of the processing period and passes the "start dataday" and "end dataday" to the PGE as Runtime Parameters. The Period Start of 8 Days Production Rule is required for PGE51.

The inputs for MOD_PRYR are the current plus 45 previous 8-day granules of MOD27W. MODAPS must not over-stage the input files. Thus, the Advanced Temporal Production Rule is required. The algorithms for setting the delta times in the start and end of the data processing period for these ancillary data sets are described in Section 5.8, Advanced Temporal Production Rule. The output MOD27Y is a running yearly product of Ocean Productivity Indices. If the processing week spans the year productivity, a "Smart" Start of Year Production Rule is required. The weekly products input to PGE51 use the "Smart" Start of Year Production Rule. The Oceans PGEs require MODAPS to use only data for the current year in the output 8-day composites. However, even during the early part of a new year, MOD_PR27Y still requires the current plus 45 previous MOD27W granules as input.

The Production Rules for PGE51 are:

- Period Start of 8 Days,
- "Smart" Start of Year,
- Optional Inputs,
- Data Day,
- Runtime Parameters,
- Minimum Number of Granules,
- Advanced Temporal.

Data Files

Static Input ESDT

MOD27LUT	MODIS/Terra LUTs for Production of MOD27W Products
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Dynamic Product Input ESDT

MODOCW ₂₇	MODIS/Terra Ocean Color QC'd Composite Params 1-36 8-Day L3 Global 4km ISEAG (Parameter 27 for MODAPS) (R) 1
MOD28WD ₁	MODIS/Terra Sea Surface Temperature QC'd Params 1-4 8-Day L3 Global 4km ISEAG (Parameter D1 for MODAPS) (R) 1
MOD27W	MODIS/Terra Ocean Weekly Productivity Indices 8-Day L4 Global 4km ISEAG (Future Yearly

MOD_PR27Y process only; current plus 45 previous files) (R) 46

Dynamic Ancillary Product Input ESDT

D4LAXMNT	GEOS-4 Late Look Montana Energy/Pressure Fields Daily L3 Global 1x1Deg EOSGRID (Minimum number of files is 0, maximum number of files is 8). (O) 0
FNMOC_ML	FNMOC Ocean Surface Mixed-Layer Depth GRIB Format Daily L4 Global 1 Deg (2-D data, packed 8X into daily file. Minimum number of files is 0, Maximum number of files is 8). (O) 0

Dynamic Product Output ESDT

MOD27W	MODIS/Terra Ocean Weekly Productivity Indices 8-Day L4 Global 4km ISEAG (A _M) (A _D) 1
MOD27Y	MODIS/Terra Ocean Annual Productivity Indices Yearly L4 Global 4km ISEAG (Future) (A _M) (A _D) 1
MOAPWA _{xx}	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 4km CylEqDis (where xx = Parameters M1, M2, ME, MD, N1, N2, F1, F2 for MODAPS) (A _M) (A _D) 1
MOAPWB _{xx}	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 36km CylEqDis (where xx = Parameters M1, M2, ME, MD, N1, N2, F1, F2 for MODAPS) (A _M) (A _D) 1
MOAPW1 _{xx}	MODIS/Terra Ocean SemiAnalytic Primary Production 8-Day L4 Global 1Deg CylEqDis (where xx = Parameters M1, M2, ME, MD, N1, N2, F1, F2 for MODAPS) (A _M) (A _D) 1
MOAPYA _{yy}	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 4km CylEqDis (where yy = Parameters M1, M2, S1, S2, W1, W2, N1, N2, F1, F2 for MODAPS; Future) (A _M) (A _D) 1
MOAPYB _{yy}	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 36km CylEqDis (where yy = Parameters M1, M2, S1, S2, W1, W2, N1, N2, F1, F2 for MODAPS; Future) (A _M) (A _D) 1
MOAPY1 _{yy}	MODIS/Terra Ocean SemiAnalytic Primary Production Yearly L4 Global 1Deg CylEqDis (where

yy = Parameters M1, M2, S1, S2, W1, W2, N1, N2,
F1, F2 for MODAPS; Future) (A_M) (A_D) 1

Dynamic Runtime Parameter for Operations

start dataday	<Start Day for Data Observations(yyyyddd)>
end dataday	<End Day for Data Observations(yyyyddd)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameter for Operations

PGEVersion	<Version of PGE51 that appears in the ciList delivered with the code>
Locgranidv	<Three-digit number that represents the PGE version; e.g., 040, 041>

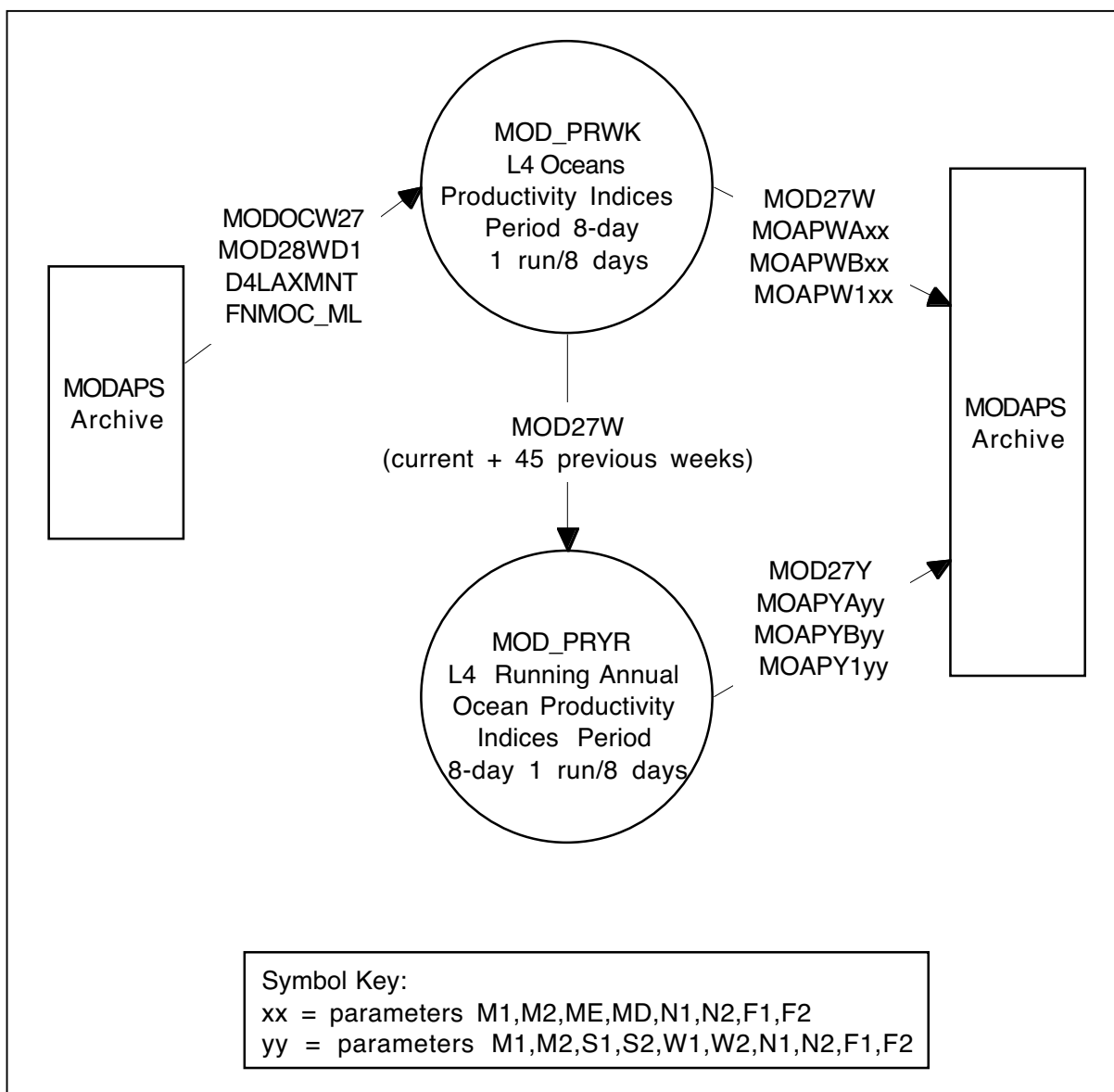


Figure 4-9 PGE51 Structure

4.52 Level 4 8-Day Oceans Chlorophyll Running Year Average and Annual Empirical Productivity (PGE52)

PGE52 performs the Ocean 8-day L3 Chlorophyll Running Year Average and L4 Annual Empirical Productivity processing. PGE52 was run as a research process.

Purpose

PGE52 produces the L3 Oceans interim 8-day Chlorophyll Running Year Average product (MODOCY27) and the L4 Annual Empirical Productivity (high variance) product (MOD27HV).

Structure

PGE52 consists of the MODIS Oceans time binning process for L4 Oceans Chlorophyll Running Year Average (MOD_PRmtbin) and MOD27HV Annual Empirical Productivity process (MOD_PR27HV). Because the PGE is still in the development stage, the structure of PGE52 is not shown in a diagram.

MODAPS Production*

The MODIS Science Team has not yet delivered PGE52. The SCF was running it as a research product. It is being maintained for possible use in the future. The proposed production descriptions below are based upon other similar Ocean PGEs.

PGE52 would be run in MODAPS Recipe AM1M_O6, which is executed every 8 days upon completion of the L3 Ocean Color Weekly (8-Day) MODOCW granules covering the processing period. Products intended for archive at MODAPS are the MODOCY27 and MOD27HV binned products and the MOSPYA, MOSPYB, and MOSPY1 maps. MODAPS temporary products are the MODOCF27 intermediate storage files. MODAPS would export MODOCY27, MOD27HV, MOSPYA, MOSPYB, and MOSPY1 to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

The MODIS Science Team has not yet delivered PGE52 and it is being run as a research product. PGE52 runs after all of the corresponding L3 Ocean 8-Day Chlorophyll MODOCW₂₇ (PGE54) outputs are completed. The operational scenario is nominally one activation every 8 days, representing the processing of one L3 Ocean Color 8-Day Running Year Product of Parameter 27 (MODOCY27) per PGE execution. The Period Start of 8 Days Production Rule is required for PGE52 to generate the 8-day MODOCY27 products, MOD27HV products, and the corresponding maps (MOSPY{A,B,1}).

The required input is the current MODOCW₂₇ plus 45 input files of MODOCW₂₇ from the previous year. The running yearly process for MOD27HV takes the MODOCY27 as input. The Data Days covered in the input and output weekly products need to be specified using the Data Day Production Rule which is a special implementation of the

Runtime Parameter Production Rule. For this Production Rule, MODAPS passes the start dataday and end dataday to the PGE as Runtime Parameters. PGE52 will require a “Smart” Start of Year Production Rule at the end of each year. The Oceans PGEs also require a specification to override the default of including the few days of the next year in the product made during the last period of the year.

The Production Rules for PGE52 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Data Day,
- Runtime Parameters.

Data Files

Static Input ESDT

MODOCTB

MODIS/Terra Ocean Time Binner Parameters

Dynamic Product Input ESDT

MODOCW₂₇

MODIS/Terra Ocean Color QC'd Composite Params
1-36 8-Day L3 Global 4km ISEAG (Parameter 27 for
MODAPS) (R) (46 current + 45 previous weeks)

Dynamic Product Output ESDT

MODOCY27

MODIS/Terra Ocean Chlorophyll Running Year
Average 8-Day L3 Global 4km ISEAG (A_M)
(A_D) 1

MOD27HV

MODIS/Terra Ocean Annual Empirical Productivity 8-
Day L4 Global 4km ISEAG (A_M) (A_D) 1

MOSPYA_{xx}

MODIS/Terra Ocean Statistical Primary Production
Yearly L4 Global 4km CylEqDis (where xx =
parameters MP, MN, MX, MC, SC, WC, NC, FC for
MODAPS) (A_M) (A_D) 1

MOSPYB_{xx}

MODIS/Terra Ocean Statistical Primary Production
Yearly L4 Global 36km CylEqDis (where xx =
parameters MP, MN, MX, MC, SC, WC, NC, FC for
MODAPS) (A_M) (A_D) 1

MOSPY1_{xx}

MODIS/Terra Ocean Statistical Primary Production
Yearly L4 Global 1deg CylEqDis (where xx =

parameters MP, MN, MX, MC, SC, WC NC, FC for
MODAPS) (A_M) (A_D) 1

Temporary Output File

MODOCF₂₇

MODIS/Terra Ocean Color Temporary Composite
Params 1-36 8-Day L3 Global 4km ISEAG (Used for
temporary storage of binned product) (I_M) 3

Dynamic Runtime Parameter for Operations

start dataday	<Start Day for Data Observations(yyyyddd)>
end dataday	<End Day for Data Observations(yyyyddd)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameter for Operations

SMFLOG_SCREEN Switch value	0
time flag	Y
output quality	A
gsfc quality	1
PGEVersion	<Version of PGE52 that appears in the ciList delivered with the code>

4.53 Level 3 Daily Oceans (PGE53)

PGE53 performs the quality controlled L3 Daily Oceans processing at MODAPS. PGE53 is not currently running in MODAPS Operations. It is being maintained for possible use in the future.

Purpose

PGE53 produces the quality controlled L3 Daily Ocean Color MODOCD_{nn} (where nn = parameters 1-36), L3 Daily Oceans Sea Surface Temperature (SST) MOD28D_{mm} (where mm = parameters D1, N1, N2), and L3 daily maps of these products.

Structure

PGE53 consists of the Ocean Daily De-clouding process (MOD_PRmcloud) and the L3 mapping processes (MOD_PRmspc and MOD_PRmmap). Figure 4-10 shows the structure of PGE53.

MODAPS Production

PGE53 is run in MODAPS Recipe AM1M_O4a, which is executed every eight days upon the completion of eight days of Ocean Color Time-Binned Interim Daily MODOCA_{nn} (where nn = parameters 1...36) and Sea Surface Temperature Time-Binned Interim Daily MOD28A_{mm} (where mm = parameters D1, N1, N2) granules covering the processing period and the corresponding 24-day (3-week) Oceans reference files of MODOCR_{nn} and MOD28R_{mm} with the center week matching the eight day processing period. Products from PGE53 archived at MODAPS are the Oceans Daily MODOCD_{nn} (where nn= parameters 1...36) and MOD28D_{mm} (where mm = parameters D1,N1,N2) and the corresponding Daily Ocean Maps M{04,36,1D}{M,S,N,Q,F,1,2,3,}D_{pp} (where pp = parameters 1...36 for Ocean Color products and D1,N1,N2 for SST products). MODAPS exports MODOCD_{nn}, MOD28D_{mm} and MO{04,36,1D}{M,S,N,Q,F,1,2,3}D_{pp} to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

PGE53 runs after one day of L3 Oceans Interim Daily (PGE20) and the corresponding L3 Ocean 24-Day (3-Week) Reference (PGE50) outputs are completed. The operational scenario is nominally 39 activations per day, representing the processing of one of L3 Ocean Color daily parameters or one L3 Ocean SST parameters in either the day or night mode per PGE execution. Thus, 39 profiles are required for PGE53, one for each parameter. The Period Specification Production Rule is required for PGE53 to acquire the L3 Interim Daily products and to generate the daily L3 Ocean Color and SST quality controlled products.

The required inputs are matching parameter sets from the daily Ocean data sets (MODOCA_{nn} and MOD28A_{mm}) and the 24-day reference data sets (MODOCR_{nn} and MOD28R_{mm}). The Advanced Temporal and Data Day Production Rules are required to

acquire the L3 Ocean 24-Day Reference products. A negative delta time is applied to the start of the daily processing period and a positive delta time is applied to the end of the daily processing period. The delta time must be sufficient to cover the start dataday under which the 3 week reference file is archived. The algorithms for setting the delta times in the start and end of the data processing period for these ancillary data sets are described in Section 5.8, Advanced Temporal Production Rule.

The Data Day Production Rule, which is a special implementation of the Runtime Parameters, is used to specify the Data Day corresponding to the processing day. For this Production Rule, MODAPS stages the input granules of the specified parameter for the day being processed and passes the start dataday and end dataday to the PGE as Runtime Parameters.

PGE53 also produces map images for each of the 39 ocean parameters. The map for each ocean parameter includes eight types of values and three resolutions or sizes. The L2 Flag, Byte 3 is only produced for parameters 13 through 25.

The Production Rules for PGE53 are:

- Period Specification,
- Advanced Temporal,
- Data Day,
- Runtime Parameters.

Data Files

Static Input ESDT

MODOCSPC	MODIS/Terra Ocean Space Converter Parameters
MODOCMAP	MODIS/Terra Oceans Mapper Parameters

Dynamic Product Input ESDT

One of the following for each PGE profile activation:

MODOCA_{nn}	MODIS/Terra Ocean Color Time-Binned Interim Params 1-36 Daily L3 Global 4km ISEAG (where nn = parameters 1...36) (R) 1*
MOD28A_{mm}	MODIS/Terra Sea Surface Temperature Time-Binned Interim Params Daily L3 Global 4km ISEAG (where mm = parameters D1, N1, N2) (R) 1*

AND one of the following for each PGE profile activation:

MODOCR_{nn}	MODIS/Terra Ocean Color Interim Composite Params 1-36 24-Day L3 Global 4km ISEAG (where nn = parameters 1...36) (R) 1*
----------------------	--

MOD28R_{mm} MODIS/Terra Sea Surface Temperature Interim
Composite Params 24-Day L3 Global 4km ISEAG
(where mm = parameters D1, N1, N2) (R) 1*

Dynamic Product Output ESDT

One of the following for each PGE profile activation:

MODOCD_{nn} MODIS/Terra Ocean Color QC'd Composite Params
1-36 Daily L3 Global 4km ISEAG (where nn =
parameters 1...36) (A_M) (A_D) 1*

MOD28D_{mm} MODIS/Terra Sea Surface Temperature QC'd Params
Daily L3 Global 4km ISEAG (where mm = D1, N1, N2)
(A_M) (A_D) 1*

*per parameter

Map Images

MO{04,36,1D}{M,S,N,Q,F,1,2,3}Dpp

MODIS/Terra Ocean Color and SST {Mean} Maps Daily L3 Global {4km} CylEqDis

{Std. Dev.} {36km}

{Number} {1Deg}

{Quality}

{Common Flags}

{Flag Byte 1}

{Flag Byte 2}

{Flag Byte 3}

(Where: M = MODIS

O = Oceans

{04, 36, 1D} = resolution and size:

04 = 4 km

36 = 36 km

1D = 1 Degree

{M, S, N, Q, F, 1, 2, 3} = values mapped:

M = Mean

S = Standard deviation

N = Number of observations

Q = Quality

F = Common flags

1 = L2 Flag Byte 1

2 = L2 Flag Byte 2

3 = L2 Flag Byte 3 (only produced for pp = 13 through 25)

D = Daily

pp = 1 through 36 for Ocean Color parameters or D1, N1,
and N2 for SST parameters.) (A_M) (A_D) 1*

Temporary Product Output Files

MODOCF _{nn}	MODIS/Terra Ocean Color Temporary Composite Params 1-36 Daily L3 Global 4km ISEAG (where nn = parameters 1...36) (used for temporary storage of binned product.) (T _M) 2*
MOD28F _{mm}	MODIS/Terra Sea Surface Temperature Temporary Composite Params Daily L3 Global 4km ISEAG (where mm parameters D1, N1, N2)(used for temporary storage of binned product) (T _M) 2*

*per parameter

Dynamic Runtime Parameter for Operations

start dataday	<Start Day for Data Observations(yyyyddd)>
end dataday	<End Day for Data Observations(yyyyddd)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>
Param	<Parameter to process>

Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	0
time flag	D
output quality	A
gsfc quality	1
longitude, origin	0.0
latitude, origin	0.0
projection rotation	0.0
longitude, center	0.0
latitude, center	0.0
output image width in degrees	0.0
output image height in degrees	0.0
which quality field	D
threshold	2.0
which quality	F
PGEVersion	<Version of PGE53 that appears in the ciList delivered with the code>

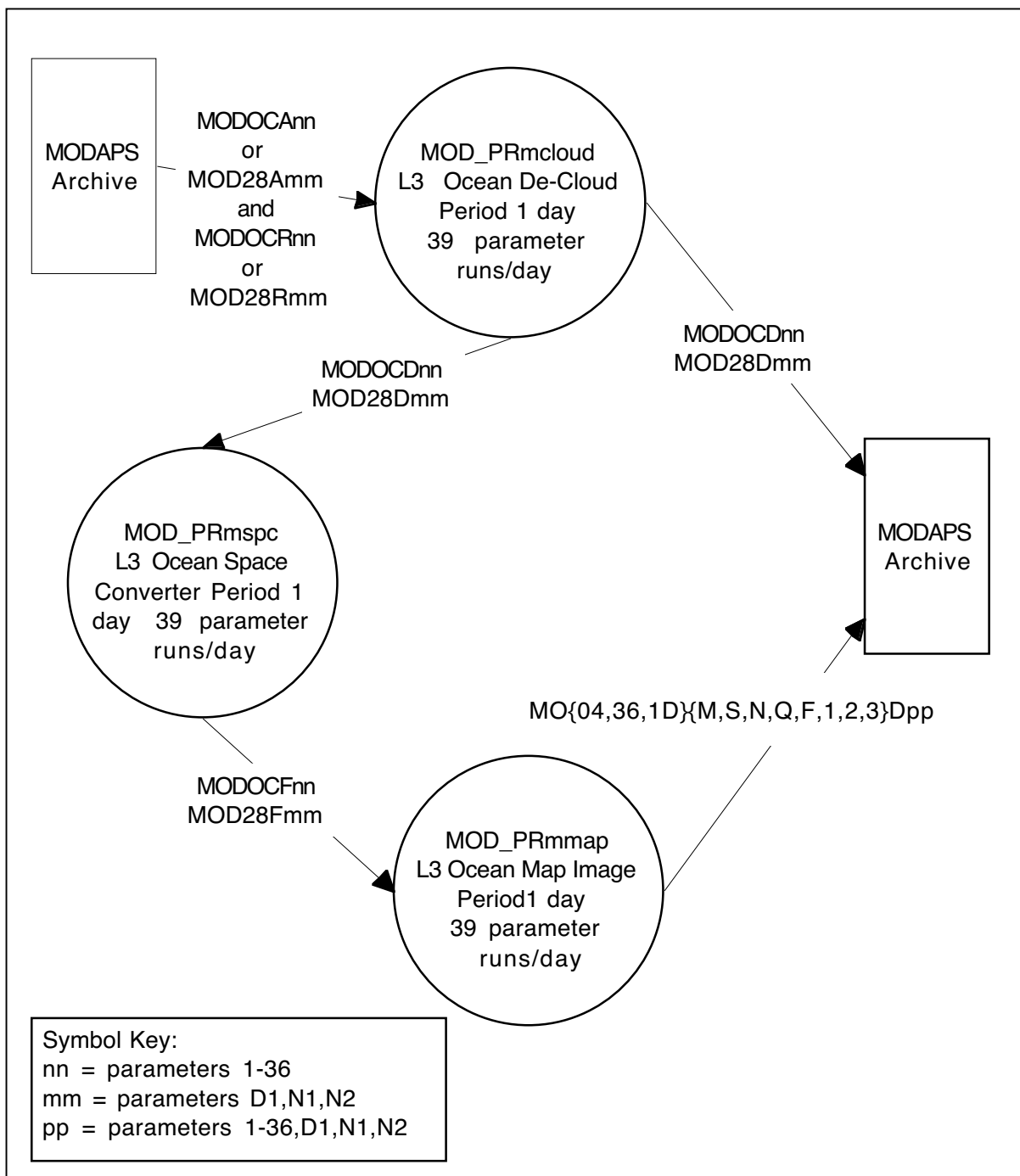


Figure 4-10 PGE53 Structure

4.54 Level 3 8-Day Oceans (PGE54)

PGE54 performs the L3 Oceans 8-day (weekly) processing at MODAPS.

Purpose

PGE54 produces the quality controlled, L3 8-day Ocean Color MODOCW_{nn} (where nn = parameters 1-36), L3 8-day Ocean Sea Surface Temperature (SST) MOD28W_{mm} (where mm = parameters D1, N1, N2) and L3 8-day maps of these products.

Structure

PGE54 consists of the Ocean 8-day (weekly) time binning process (MOD_PRmtbin) and the L3 mapping processes (MOD_PRmspc and MOD_PRmmap). Figure 4-11 shows the structure of PGE54.

MODAPS Production

PGE54 is run in MODAPS Recipe AM1M_O4b, which is executed every 8 days when Oceans Daily granules covering the 8-day processing period are available. PGE54 executes at the completion of PGE20 when the Ocean Daily granules MODOCD_{nn} (where nn = parameters 1-36) and MOD28D_{mm} (where mm = parameters D1, N1, N2) covering the 8-day processing period are generated. Products from PGE54 archived at MODAPS are the Oceans Weekly MODOCW_{nn} and MOD28W_{mm} and the corresponding Weekly Oceans maps MO {04, 36, 1D} {M,S,N,Q,F,1,2,3}W_{pp} (where pp = parameters 1 through 36 for each Ocean Color and D1, N1, N2 for SST). The MOD28WD2 that was removed from the original products may be produced again in the future. MODAPS exports MODOCW_{nn}, MOD28W_{mm}, and MO {04, 36, 1D} {M,S,N,Q,F,1,2,3}W_{pp} to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

PGE54 runs after eight days of L3 Oceans Daily (PGE20) processing has been completed. The operational scenario is nominally 39 activations every 8 days, representing the processing of one of the L3 Ocean Color 8-day parameter products or one of the L3 Ocean SST 8-day parameters per PGE execution. Thus, 39 profiles are required for PGE54, one for each parameter. The Period Start of 8 Days Production Rule is required for PGE54. PGE54 will require a "Smart" Start of Year Production Rule at the end of each year. The Oceans PGEs also require a specification for MODAPS to override the default of including the few days of the next year in the product made during the last period of the year.

Nominally eight days of one of the following L3 Oceans daily input products are required: MODOCD_{nn} or MOD28D_{mm}. The Data Days covered in the input and output 8-day products need to be specified using the Data Day Production Rule, which is a special implementation of the Runtime Parameter. For this Production Rule, MODAPS stages the input granules of the parameter being processed according to their Data Day to match the Oceans 8-day output and passes the start dataday and end dataday to the

PGE as Runtime Parameters. A Minimum Number of Granules for the required daily input products is specified and a time-out is associated for running PGE54 if the minimum requirements are met.

PGE54 also produces map images for each of the 39 ocean parameters. The maps for each ocean parameter include eight types of values and three resolutions or sizes. The L2 Flag Byte 3 is only produced for parameters 13 through 25.

The Production Rules for PGE54 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Data Day,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MODOCTB	MODIS/Terra Ocean Time Binner Parameters
MODOCSPC	MODIS/Terra Ocean Space Converter Parameters
MODOCMAP	MODIS/Terra Oceans Mapper Parameters

Dynamic Product Input ESDT

One of the following for each PGE profile activation:

MODOCD _{nn}	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Daily L3 Global 4km ISEAG (where nn = parameters 1 through 36) (R) 1*
MOD28D _{mm}	MODIS/Terra Sea Surface Temperature QC'd Params Daily L3 Global 4km ISEAG (where mm = parameters D1, N1, N2) (R) 1*

Dynamic Product Output ESDT

One of the following for each PGE profile activation:

MODOCW _{nn}	MODIS/Terra Ocean Color QC'd Composite Params 1-36 8-Day L3 Global 4km ISEAG (where nn = parameters 1 through 36) (A _M) (A _D) 1*
MOD28W _{mm}	MODIS/Terra Sea Surface Temperature QC'd Params 8-Day L3 Global 4km ISEAG (where mm = parameters D1, N1, N2) (A _M) (A _D) 1*

Map Images

MO{04,36,1D}{M,S,N,Q,F,1,2,3}Wpp

MODIS/Terra Ocean Color and SST {Mean} Maps 8-Day L3 Global {4km} CylEqDis

{Std. Dev.} {36km}

{Number} {1Deg}

{Quality}

{Common Flags}

{Flag Byte 1}

{Flag Byte 2}

{Flag Byte 3}

(Where: M = MODIS

O = Oceans

{04, 36, 1D} = resolution and size:

04 = 4 km

36 = 36 km

1D = 1 Degree

{M, S, N, Q, F, 1, 2, 3} = values mapped:

M = Mean

S = Standard deviation

N = Number of observations

Q = Quality

F = Common flags

1 = L2 Flag Byte 1

2 = L2 Flag Byte 2

3 = L2 Flag Byte 3 (only produced for pp = 13 through 25)

D = Daily

pp = 1 through 36 for Ocean Color parameters or D1, N1,

and N2 for SST parameters.) (A_M) (A_D) 1***Temporary Product Output**MODOCF_{nn}MODIS/Terra Ocean Color Temporary Composite Params 1-36 8-Day L3 Global 4km ISEAG (where nn = parameters 1 through 36; used for temporary storage of binned product) (T_M) 26*MOD28F_{mm}MODIS/Terra Sea Surface Temperature Temporal Composite Params 8-Day L3 Global 4km ISEAG (where mm = parameters D1, N1, N2; used for temporary storage of binned product) (T_M) 26*

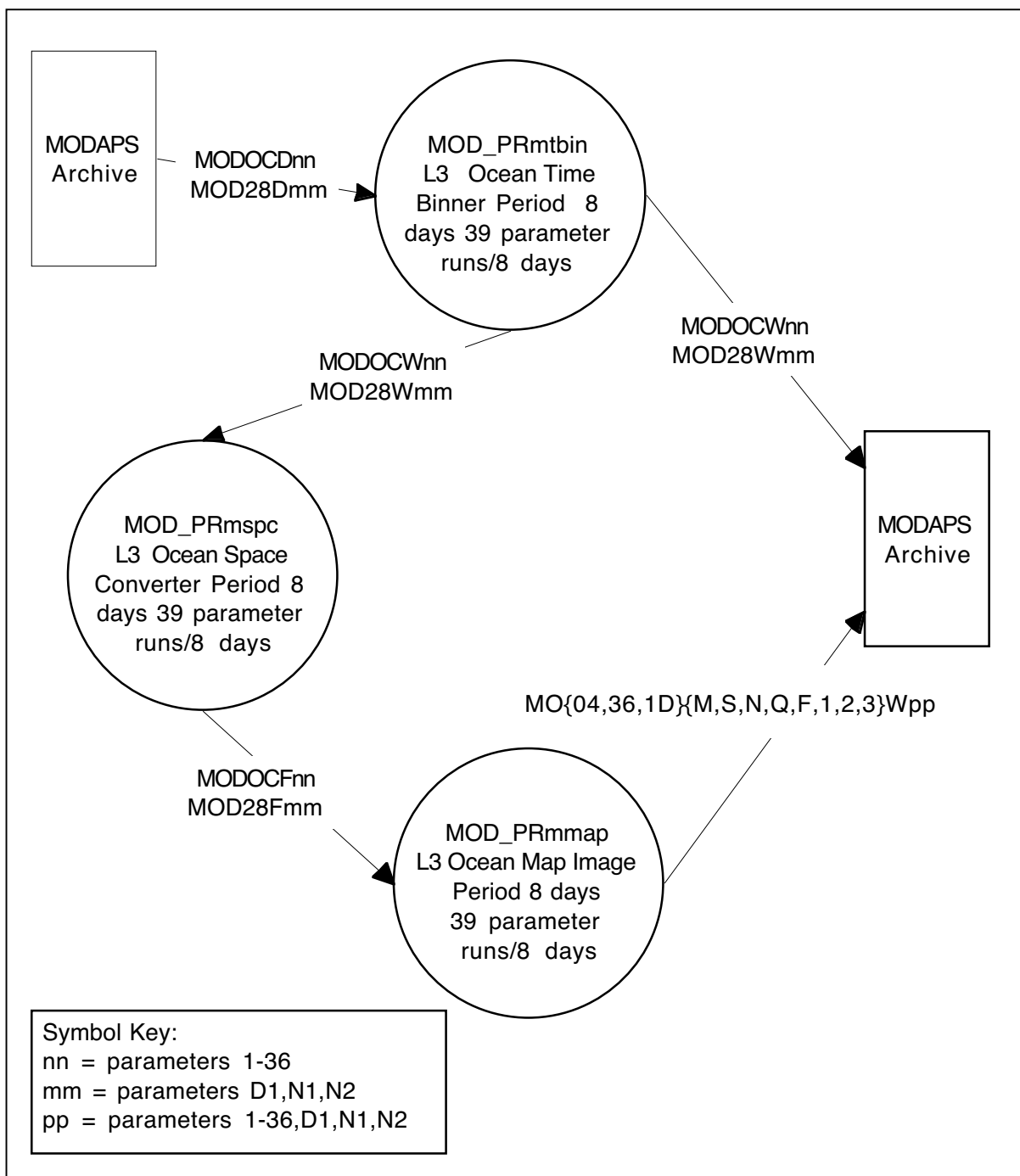
*per parameter

Dynamic Runtime Parameter for Operations

start dataday	<Start Day for Data Observations(yyyyddd)>
end dataday	<End Day for Data Observations(yyyyddd)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
Param	<Parameter to process>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	"0"
time flag	"W"
output quality	"A"
gsfc quality	"1"
longitude, origin	"0.0"
latitude, origin	"0.0"
projection rotation	"0.0"
longitude, center	"0.0"
latitude center	"0.0"
output image width in degrees	"0.0"
output image height in degrees	"180.0"
which quality field	"D"
PGEVersion	<Version of PGE54 that appears in the ciList delivered with the code>

**Figure 4-11 PGE54 Structure**

4.55 Level 3 Daily Clear Sky Radiance Statistics (PGE55)

PGE55 will perform the L3 Daily Clear Sky Radiance Statistics processing at MODAPS.

Purpose

PGE55 produces the L3 Daily Clear Sky Radiance Statistics product (MODCSR_D).

Structure

PGE55 consists of the L3 Clear Sky Radiance Statistics Daily process (MOD_PRCSD).

MODAPS Production

The MODIS Atmosphere Group has not yet completed PGE85. It is in the development stage at MODIS SDST. PGE55 will run at MODAPS in Recipe AM1M_A6. PGE55 is run every day upon the availability of all of the 5-minute MODCSR_G Clear Sky Radiance Statistics granules for this day. Each execution of PGE55 generates a daily granule of MODCSR_D that will be archived at MODAPS. MODAPS will export MODCSR_D to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

The operations scenario is one activation every day. The Period Specification Production Rule is used for the daily activation. The required input is MODCSR_G, consisting of the 5-minute granules of Clear Sky Radiance Statistics for the day. A Minimum Number of Granules and associated time-out is set for running PGE55 without all of the required input granules for the day if some are determined to be unavailable due to problems upstream in the processing. The daily output granules of Clear Sky Radiance Statistics (MODCSR_D) are archived and exported.

The basic Production Rules for PGE55 are:

- Period Specification,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MODCSR_G	MODIS/Terra Clear Sky Radiance Statistics Index 25km Global Grid 5-Min L2 Swath (R) 1
----------	--

Dynamic Product Output ESDT

MODCSR_D	MODIS/Terra Clear Sky Radiance Statistics Daily L3 Global 25km Equal Area (A _M) (A _D) 1
----------	--

Dynamic Runtime Parameter for Operations

Collection Start Time	<Start time for data observations>
Collection End Time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL	"processed once"
REPROCESSINGPLANNED	"further update is anticipated"
PGEVERSION	<Version of PGE55 that appears in the ciList delivered with the code>

4.56 Level 3 Daily Atmosphere (PGE56)

PGE56 performs the L3 Daily Atmosphere processing at MODAPS.

Purpose

PGE56 produces L3 Daily Aerosol Cloud Water Vapor Ozone Product (MOD08_D3) and the corresponding high resolution product (MOD08D3H).

Structure

PGE56 consists of the L3 Atmosphere Daily process (MOD_PR08D) and corresponding high resolution process (MOD_PR08DH). These processes run independently in the same PGE.

MODAPS Production

PGE56 is run in MODAPS Recipe AM1M_A3, which is executed every day upon the availability of up to 36 zonal tiles of MOD08_TL covering the processing period. Products archived at MODAPS are daily granules of MOD08_D3 and MOD08D3H for the GMT Day of the processing period. MODAPS exports MOD08_D3 to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

PGE56 runs after one day of 36 atmosphere zonal tiles (PGE69) outputs are produced. The operational scenario is nominally one activation per day, representing the input of 36 zonal tiles to produce one L3 daily atmospheric granule per PGE execution. The Period Specification Production Rule is required for PGE56 to generate the daily products.

The L3 Atmosphere daily product (MOD08_D3) is created from daily zonal tile file inputs. MOD_PR08D and MOD_PR08DH read the MOD08_TL and MOD08TLH zonal tile files, respectively, and perform the data processing on the tiles for the day. These processes fill the science data arrays, write the ECS metadata, and write the MOD08_D3 product file and the high resolution product MOD08D3H.

The production system stages all granules whose temporal coverage overlaps the specified GMT data day. PGE56 runs if all 36 zonal tiles are available. Otherwise production should wait for further instructions from the Science Team. A minimum of one granule each of MOD08_TL and MOD08TLH is required for input to PGE56. No more than 36 zonal tiles may be staged.

The Production Rules for PGE56 are:

- Period Specification,
- Minimum Number of Granules.

Data Files**Dynamic Product Input ESDT**

MOD08_TL	MODIS/Terra Atmosphere Zonal Tiling Daily L3 Latitude Zone 1 Deg CMG (R) 1
MOD08TLH	MODIS/Terra Atmosphere Zonal Tiling Daily L3 Latitude Zone 0.1Deg CMG (R) 1

Dynamic Product Output ESDT

MOD08_D3	MODIS/Terra Aerosol Cloud Water Vapor Ozone Daily L3 Global 1Deg CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MOD08D3H	MODIS/Terra Aerosol/Water Vapor/Cloud Daily L3 Global 0.1 Deg CMG (I _M) 1
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Dynamic Runtime Parameters for Operations

start dataday	<Start Day for Data Observations(yyyyddd)>
end dataday	<End Day for Data Observations(yyyyddd)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

PGEVERSION	<Version of PGE56 that appears in the ciList delivered with the code>
REPROCESSINGACTUAL	"reprocessed"
REPROCESSING PLANNED	"further update is anticipated"
MetadataEnd	None
LOCALVERSIONID	<Value of Collection Version; current value = 004>

4.57 Level 3 Monthly Atmosphere (PGE57)

PGE57 performs the L3 calendar Monthly Atmosphere processing at MODAPS.

Purpose

PGE57 produces L3 Monthly Aerosol Cloud Water Vapor Ozone product (MOD08_M3).

Structure

PGE57 consists of the L3 Atmosphere Monthly process (MOD_PR08M).

MODAPS Production

PGE57 is run in MODAPS Recipe AM1M_A5, which is executed every calendar month upon the availability of all the MOD08_D3 granules that are expected for coverage of this processing period. Products archived at MODAPS are monthly granules of MOD08_M3 for the month of the processing period. MODAPS exports MOD08_M3 to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

PGE57 runs after one calendar month of L3 Atmosphere Daily (PGE56) outputs are completed. The operational scenario is nominally one activation every month, representing the processing of one month of daily atmosphere granules of MOD08_D3 per PGE execution. The Period Specification Production Rule is required for PGE57 to generate the monthly atmosphere MOD08_M3 product.

The L3 Atmosphere monthly product (MOD08_M3) is created from daily MOD08_D3 file inputs. MOD_PR08M reads the MOD08_D3 files and performs the data processing on the daily granules for the month. This process fills the science data arrays, writes the ECS metadata, and writes the MOD08_M3 product file.

The required input is a minimum of one granule of MOD08_D3. The Production System stages all daily MOD08_D3 granules whose temporal coverage falls within the calendar month. PGE57 runs if all of the daily files are available. Otherwise the production system should wait for further instruction from the Science Team.

The Production Rules for PGE57 are:

- Period Specification,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD08_D3	MODIS/Terra Aerosol Cloud Water Vapor Ozone Daily L3 Global 1Deg CMG (R) 1
----------	---

Dynamic Product Output ESDT

MOD08_M3	MODIS/Terra Aerosol Cloud Water Vapor Ozone Monthly L3 Global 1Deg CMG (A _M) (A _D) 1
----------	---

Dynamic Runtime Parameters for Operations

start dataday	<Start Day for Data Observations>
end dataday	<End Day for Data Observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM-1, PM-1}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

PGEVERSION	<Version of PGE57 that appears in the ciList delivered with the code>
REPROCESSINGACTUAL	"reprocessed"
REPROCESSINGPLANNED	"further update is anticipated"
SizeMetadataEnd	None
LOCALVERSIONID	<Value of Collection Version; current value = 004>

4.58 Level 3 8-Day Land Surface Temperature CMG (PGE58)

PGE58 performs the 8-day CMG Land Surface Temperature (LST) processing at MODAPS.

Purpose

PGE58 produces the L3 CMG 8-day LST/Emissivity product (MOD11C2) and the Land QA product (MODLM_QA).

Structure

PGE58 consists of the CMG LST/Emissivity 8-day process (MOD_PR11C2) and the Land QA process (MOD_PRLQA).

MODAPS Production

PGE58 runs in MODAPS Recipe AM1M_L15, which is executed every 8 days upon the availability of all of the daily LST CMG (MOD11C1) granules for the 8-day processing period from PGE32. The product archived at MODAPS is the 8-day MOD11C2 LST CMG. The MODAPS Interim product is MODLM_QA. MODAPS exports MOD11C2 to the PDR Server for archive and distribution at the LP DAAC.

Production Rules

PGE58 runs after the 8 days of L3 LST/Emissivity CMG product (MOD11C1) for the current processing period have been produced. The operational scenario is nominally one activation every 8 days. The Period Start of 8 Days Production Rule is required for PGE58. PGE58 will require a “Smart” Start of Year Production Rule at the end of each year. For the last 8-day period at the end of each year, only the 5 or 6 days in the current calendar year should be included in the MOD11C2 CMG product.

The required input is MOD11C1. The global MOD11C2 product is generated from all of the available daily LST CMG granules of MOD11C1. A Minimum Number of Granules, representing the number of daily granules, is specified for MOD11C1 and time-outs are associated for running PGE58 if the minimum requirements are met. The first set of values is all 8 days of MOD11C1 with a wait-time of five days. After this PGE58 should be run if there is at least one daily MOD11C1 file.

The Production Rules for PGE58 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Minimum Number of Granules.

Data Files**Dynamic Product Input ESDT**

MOD11C1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 0.05Deg CMG (R) 1
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Dynamic Product Output ESDT

MOD11C2	MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 0.05Deg CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

ReprocessingPlanned value	"further update is anticipated"
ReprocessingActual value	"reprocessed"
PGE58 Version	<Version of PGE58 that appears in the ciList delivered with the code>

4.59 Level 3 Monthly Land Surface Temperature CMG (PGE59)

PGE59 performs the monthly CMG Land Surface Temperature (LST) processing at MODAPS.

Purpose

PGE59 produces the CMG monthly LST/Emissivity product (MOD11C3) and the Land QA product (MODLM_QA).

Structure

PGE59 consists of the L3 CMG LST monthly process (MOD_PR11C3) and the Land QA process (MOD_PRLQA).

MODAPS Production

PGE59 runs in MODAPS Recipe AM1M_L17, which is executed every calendar month upon the availability of all of the daily LST CMG (MOD11C1) granules for the monthly processing period from PGE32. The product archived at MODAPS is the monthly MOD11C3 LST CMG. The MODAPS Interim product is MODLM_QA. MODAPS exports MOD11C3 to the PDR Server for archive and distribution at the LP DAAC.

Production Rules

PGE59 runs after all of the daily L3 LST CMG products (MOD11C1 covering the monthly period) have been produced by PGE32. The operational scenario is nominally one activation every calendar month. The Period Specification Production Rule is required for PGE59.

The required input is MOD11C1. The global MOD11C3 product is generated from all of the available daily LST CMG granules of MOD11C1 for the month. A Minimum Number of Granules, representing the number of daily granules, is specified for MOD11C1 and time-outs are associated for running PGE59 if the minimum requirements are met. The first set of values is all days of MOD11C1 for the month with a wait-time of five days. After this PGE59 should be run if there is at least one daily MOD11C1 file.

The Production Rules for PGE59 are:

- Period Specification,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD11C1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 0.05Deg CMG (R) 1
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Dynamic Product Output ESDT

MOD11C3	MODIS/Terra Land Surface Temperature/Emissivity Monthly L3 Global 0.05Deg CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

ReprocessingPlanned value	"further update is anticipated"
ReprocessingActual value	"reprocessed"
PGE59 Version	<Version of PGE59 that appears in the ciList delivered with the code>

4.60 Geolocation Control Point (PGE60)

PGE60 performs the L2 Geolocation Control Point matching, which is performed with each MOD03 input file at MODAPS. This results in 288 executions of this PGE per day executed at MODAPS. Each output data granule covers a period of five minutes. The PGE nominally outputs 288 granules of each product per day. The geolocation control point residuals product contains measured and observed positions of land chip and island control points. These are used in Geolocation analysis to improve the accuracy of future Geolocation products (MOD03).

Purpose

PGE60 determines the observed location of land chip and island control points and produces the Geolocation Control Point Residuals product (MOD03CP).

Structure

PGE60 is comprised of a single processing step; MOD_PR03CP performs control point matching with control point images visible in the MODIS L1B and Surface Reflectance products. PGE60 uses Cloud Mask, Snow, and Sea Ice products to exclude control point images that may be obscured.

MODAPS Production

PGE60 is run in MODAPS Recipe AM1M_L2, which is executed every 5-minutes upon the availability of all of the Geolocation Fields (MOD03), L1B Radiances (MOD02QKM), Surface Reflectance (MOD09), Cloud Mask (MOD35_L2), Snow Cover (MOD10_L2), and Sea Ice Extent (MOD29) granules that are expected for the processing period. The output MOD03CP is an Interim product at MODAPS.

Production Rules

PGE60 is data driven and is executed when new MOD03, L1B, MOD09, MOD35_L2, MOD10_L2, and MOD29 data are available, approximately every five minutes. The required input for PGE60 is MOD03. Either MOD09 or MOD02QKM are desired, but PGE60 will run without either of them. The MOD09 and MOD02QKM files are not substitutes for each other; PGE60 uses both if both are available, but can still usefully run with reduced effectiveness if one or both is missing. MOD_PR03CP will also use any available L2 Snow Cover and Sea Ice Extent products to perform obscuration exclusion. Only MOD29 daytime data are to be staged; the DayNightFlag for MOD29 files should be either "Day" or "Both". The MOD10_L2, MOD29, and MOD35_L2 inputs are optional.

Inputs to MOD_PR03CP include an island library file containing a list of island central positions determined from World Vector Shoreline data and 466 land control point "chip" files.

PGE60 is executed when the required MOD03 granule is available and the wait time has expired for all of the optional ESDT inputs. Wait times are set at the

recommendation of the MODIS discipline groups for the optional inputs of MOD02QKM, MOD09, MOD10_L2, MOD29, and MOD35_L2 to be available.

The basic Production Rules for PGE01 are:

- Basic Temporal,
- Optional Inputs,
- Metadata Based Query.

Data Files

Static Input ESDT

MODCPLUT	MODIS/Terra Parameters and Control Point Library Files for Production of MOD03CP Product
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Dynamic Product Input ESDT

MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1
MOD02QKM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 250 m (O) 0
MOD09	MODIS/Terra Land Surface Reflectance 5-Min L2 Swath 250m, 500m and 1km (O) 0
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km (O) 0
MOD10_L2	MODIS/Terra Snow Cover 5-Min L2 Swath 500m (O) 0
MOD29	MODIS/Terra Sea Ice Extent 5-Min L2 Swath 1km (O) 0

Quality Control Output ESDT

MOD03CP	MODIS/Terra Geolocation Control Point Residuals 5- Min L2 50m (I _M) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

Source for spacecraft kinematic state	MODIS Packet
Search for land control points	1
Search for single islands	1
Search for island triplets	0
Use Cloud Mask input file	1

Use Sea Ice input file	1
Use Snow Cover input file	1
MOD_PRO3CP Version	<Version of PGE60 that appears in ciList delivered with the code>

4.61 Level 3 Yearly Vegetation Continuous Fields (PGE61)

PGE61 performs the L3 Yearly 500m Vegetation Continuous Fields processing at MODAPS.

Purpose

PGE61 produces the L3 Yearly 500m Vegetation Continuous Fields (MOD44B) and the Land QA product (MODLM_QA).

Structure

PGE61 consists of the L3 Yearly 500m Vegetation Continuous Fields process (MOD_PR44B) and the Land QA process (MOD_PRLQA).

MODAPS Production

The MODIS Science Team has not yet delivered PGE61.

Production Rules

PGE61 runs after a year of L3 16-Day Vegetation Intermediate Composite tiled products from PGE72 have been generated. The operational scenario is a maximum of 286 activations every year, representing the processing of one Land tile per PGE execution. The Period Specification Production Rule is required for PGE61. The required inputs are MOD44CH and MOD44CQ. Since the PGE has not been delivered, it is uncertain whether both the 250m and 500m input products will be required or just one of these.

PGE61 requires the Latitude/Longitude Tiling Production Rule. To execute PGE61, a Latitude/Longitude tile definition file must be associated with the PGE. MODAPS passes the TileID to PGE61 as a dynamic runtime parameter.

The Production Rules for PGE61 are:

- Period Specification,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD44CH	MODIS/Terra Vegetation Intermediate Composite 16-Day L3 Global 500m SIN Grid (R) *
MOD44CQ	MODIS/Terra Vegetation Intermediate Composite 16-Day L3 Global 250m SIN Grid (R) *

Dynamic Product Output ESDT

MOD44B	MODIS/Terra Vegetation Continuous Field Yearly L3 Global 500m SIN Grid	(A _M)	(A _D)	1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance	(I _M)		1
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* The MODIS Science Team has not delivered PGE61; the number of files required is unavailable.

4.62 Level 3 32 -Day Thermal Anomalies/Fire CMG (PGE62)

PGE62 performs the 32-Day global CMG Thermal Anomalies/Fire processing at MODAPS.

Purpose

PGE62 produces the global 32-Day Thermal Anomalies/Fire CMG product (MOD14C3) and the Land QA product (MODLM_QA).

Structure

PGE62 consists of the 32-Day CMG Thermal Anomalies/Fire process (MOD_PR14C) and the Land QA process (MOD_PRLQA).

MODAPS Production

The MODIS Science Team has not yet delivered PGE62.

Production Rules

PGE62 runs after all of the L3 daily thermal anomalies (MOD14A1) tiled products and L3 8-day thermal anomalies (MOD14A2) tiled products from PGE29 have been generated for the 32-day period. The operational scenario is nominally one activation every 32 days. The Period Start of 32 Days Production Rule is required for PGE62.

The required inputs are MOD14A1 and MOD14A2, which have been generated with day and night mode data together. Thus, the MOD14C3 is produced together in day mode and night mode. It is uncertain whether both MOD14A1 and MOD14A2 will be required inputs.

The global MOD14C3 product is generated from all of the available daily Land tiles of MOD14A1 and 8-day Land tiles of MOD14A2 for the 32-day period. A Minimum Number of Granules, representing the number of tiles, is specified for MOD14A1 and MOD14A2 and a time-out is associated for running PGE62 if the minimum requirements are met.

The Production Rules for PGE62 are:

- Period Start of 32 Days,
- "Smart" Start of Year,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD14A1	MODIS/Terra Thermal Anomalies/Fire Daily L3 Global 1km SIN Grid (R) *
MOD14A2	MODIS/Terra Thermal Anomalies/Fire 8-Day L3 Global 1km SIN Grid (R) *

Dynamic Product Output ESDT

MOD14C3	MODIS/Terra Thermal Anomalies/Fire 32-Day L3
	Global 0.05Deg CMG (A _M) (A _D) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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* The MODIS Science Team has not delivered PGE62; the number of tiled files required is unavailable.

4.63 Level 4 Monthly Leaf Area Index/FPAR CMG (PGE63)

PGE63 performs the monthly CMG Leaf Area Index (LAI)/FPAR processing at MODAPS.

Purpose

PGE63 produces the monthly global LAI/FPAR CMG product (MOD15C2) and the Land QA product (MODLM_QA).

Structure

PGE63 consists of the LAI/FPAR Monthly CMG process (MOD_PR15C2) and the Land QA process (MOD_PRLQA).

MODAPS Production

The MODIS Science Team has not yet delivered PGE63.

Production Rules

PGE63 runs after four 8-day sets of L4 LAI/FPAR Land tiles (MOD15A2) from PGE34 have been produced. The operational scenario is nominally one activation every month. The Period Specification Production Rule is required for PGE63.

The required input is MOD15A2, which has been generated only in day mode. Thus, the output product MOD15C2 is produced only in day mode. The global MOD15C2 product is generated from all of the available 8-day Land tiles of MOD15A2 corresponding to the month. A Minimum Number of Granules, representing the number of 8-day tiles, is specified for MOD15A2 and a time-out is associated for running PGE63 if the minimum requirements are met.

The Production Rules for PGE63 are:

- Period Specification,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD15A2	MODIS/Terra Leaf Area Index/FPAR 8-Day L4 Global 1km SIN Grid (R) *
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Dynamic Product Output ESDT

MOD15C2	MODIS/Terra Leaf Area Index/FPAR Monthly L4 Global 0.05Deg CMG (A_M) (A_D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I_M) 1
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*The MODIS Science Team has not delivered PGE63; the number of files required is unavailable.

4.64 Level 4 Yearly Net Primary Production CMG (PGE64)

PGE64 performs the yearly CMG Net Primary Production (NPP) processing at MODAPS.

Purpose

PGE64 produces yearly global NPP CMG product (MOD17C3) and the Land QA product (MODLM_QA).

Structure

PGE64 consists of the NPP Yearly CMG process (MOD_PR17C3) and the Land QA process (MOD_PRLQA).

MODAPS Production

The MODIS Science Team has not yet delivered PGE64.

Production Rules

PGE64 runs after the yearly Land tiles of L4 NPP products (MOD17A3) from PGE38 have been produced. The operational scenario is nominally one activation every year. The Period Specification Production Rule is required for PGE64.

The required input is MOD17A3, which has been generated only in day mode. Thus, the output product MOD17C3 is produced only in day mode. The global MOD17C3 product is generated from all of the available yearly Land tiles of MOD17A3. A Minimum Number of Granules, representing the number of yearly tiles, is specified for MOD17A3 and a time-out is associated for running PGE64 if the minimum requirements are met.

The Production Rules for PGE64 are:

- Period Specification,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD17A3	MODIS/Terra Net Primary Production Yearly L4
	Global 1km SIN Grid (R) *

Dynamic Product Output ESDT

MOD17C3	MODIS/Terra Net Primary Production Yearly L4
	Global 0.05Deg CMG (A _M) (A _D) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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* The MODIS Science Team has not delivered PGE64; the number of files required is unavailable.

4.65 Level 3 16-Day Bi-Directional Reflectance Distribution Function/ Albedo CMG (PGE65)

PGE65 performs the 16-day CMG Bi-Directional Reflectance Distribution Function (BRDF)/Albedo processing at MODAPS.

Purpose

PGE65 produces the L3 global CMG 16-day BRDF/Albedo product (MOD43C2) and the Land QA product (MODLM_QA).

Structure

PGE65 consists of the CMG BRDF/Albedo 16-day process (MOD_PR43C) and the Land QA process (MOD_PRLQA).

MODAPS Production

PGE65 is run in MODAPS Recipe AM1M_L13, which is executed every 16 days after the 16-day BRDF/Albedo processing has completed in PGE23. The global CMG MOD43C2 is generated from all available tiles of MOD43B1. MOD43C2 is archived at MODAPS and exported to the PDR Server for archive and distribution at the LP DAAC. The MODAPS Interim product is MODLM_QA.

Production Rules

PGE65 runs after the 16-day tiles of L3 BRDF/BARS (MOD43B1) from PGE23 have been produced. The operational scenario is nominally one activation every 16 days. The Period start of 16 Days Production Rule is required for PGE65. PGE65 will require a "Smart" Start of Year Production Rule at the end of each year.

The required input is MOD43B1, which has been generated only in day mode. Thus, the output product MOD43C2 is produced only in day mode. The global MOD43C3 product is generated from all of the available 16-day land tiles of MOD43B1 for the 16-day period. A Minimum Number of Granules, representing the number of 16-day tiles, is specified for MOD43B1 and a time-out is associated for running PGE65 if the minimum requirements are met.

The Production Rules for PGE65 are:

- Period Start of 16 Days,
- "Smart" Start of year,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD43B1	MODIS/Terra BRDF/Albedo Model-1 16-Day L3 Global 1km SIN Grid (R) 1
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Dynamic Product Output ESDT

MOD43C2	MODIS/Terra BRDF/Albedo Parameters 16-Day L3 Global 0.05Deg CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

PGE65 Version	<Version of PGE65 that appears in ciList delivered with the code>
REPROCESSING_PLANNED	"further update is anticipated"
REPROCESSING_ACTUAL	"reprocessed"

4.66 Level 3 96-Day Vegetation Cover Conversion 250m (PGE66)

PGE66 performs the L4 96-Day 250m Vegetation Cover Conversion processing at MODAPS.

Purpose

PGE66 produces L3 96-Day 250m Vegetation Cover Conversion product (MOD44A), the corresponding subsetting Vegetation Cover Conversion product (MOD_SS), and the Land QA product (MODLM_QA).

Structure

PGE66 consists of the L3 96-Day 250m Vegetation Cover Conversion process (MOD_PR44A) and the Land QA process (MOD_PRLQA). PGE66 also runs the Land shared MOD_PRSS.pl script to produce the subsetting products.

MODAPS Production

PGE66 is run in MODAPS Recipe AM1M_L14, which is executed every 96 days after the 16-day MOD44CQ and MOD44CH input products for the 96-day period are produced by PGE72. MOD44A is archived at MODAPS and exported to the PDR Server for archive and distribution at the LP DAAC. MODAPS Interim products are MOD_SS and MODLM_QA.

Production Rules

PGE66 runs after the 16-Day Vegetation Intermediate Composite sets of tiled granules at 250m (MOD44CQ) and 500m (MOD44CH) have been produced by PGE72 for the 96-day period. MOD44CQ and MOD44CH are required inputs for PGE66. The previous 96-day MOD44A output file is an optional input. One tile is processed at a time for the 96-day period and the correct tiles of input products must be staged for PGE66.

To obtain the best quality product, the following MOD44CQ and MOD44CH input files should be staged for PGE66 runs for the first three quarters of the year:

- All of the MOD44CQ and MOD44CH for the current quarter.
- All of the MOD44CQ and MOD44CH for the previous two quarters.
- All of the MOD44CQ and MOD44CH from one year prior to each of the above quarters.

MODAPS sets a wait time for the input to be available in accord with the request by the SCF. If some of the input files of the required MOD44CQ and MOD44CH type are not available when the wait time is up, the Optional Input Production Rule is implemented to stage the input files as follows:

- At least one MOD44CQ and MOD44CH for the current 96-day period.
- At least one MOD44CQ and MOD44CH for the corresponding time period in the previous year.

For the last quarter of the year only the MOD44CQ and MOD44CH data for the current year should be staged as input to PGE66.

Out of the total number of Land tiles over the surface of the Earth defined in the Sinusoidal projection, PGE66 generates products for 286 tiles. The operational scenario is nominally 286 activations every 96 days, representing the processing of one land tile per PGE execution. The Period Start of 96 Days Production Rule is required for PGE66. PGE66 will require a “Smart” Start of Year Production Rule at the end of each year.

PGE66 requires the Latitude/Longitude Tiling Production Rule. To execute PGE66, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. Since PGE66 now obtains the TileID from the input products, the data processing system does not need to set the TileID as a dynamic routine parameter.

The basic Production Rules for PGE66 are:

- Period Start of 96 Days,
- Advanced Temporal,
- “Smart” Start of Year,
- Latitude/Longitude Tiling,
- Optional Inputs,
- Metadata Based Query,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MOD44LUT	MODIS/Terra LUTs for Production of MOD44A Products
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Dynamic Product Input ESDT

MOD44CQ	MODIS/Terra Vegetation Intermediate Composite 16-Day L3 Global 250m SIN Grid (R) 10
MOD44CH	MODIS/Terra Vegetation Intermediate Composite 16-Day L3 Global 500m SIN Grid (R) 10
MOD44A	MODIS/Terra Vegetation Cover Conversion 96-Day L3 Global 250m SIN Grid (Previous) (O) 0

Dynamic Product Output ESDT

MOD44A	MODIS/Terra Vegetation Cover Conversion 96-Day L3 Global 250m SIN Grid (A _M) (A _D) 1
MOD_SS	MODIS/Terra Land Subsetting QA Files: MODIS/Terra Vegetation Cover Conversion 96-Day L3 Global 250m SIN Grid (Filename contains MOD_SS.MOD44A to identify the particular subsetting product.) (I _M) 1+

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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+ One file produced per validation site; maximum of 15 sites allowed.

Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

PGE66 Version	<Version of PGE66 that appears in the ciList delivered with the code>
mod_prss_infile_luns	<Lun numbers for products to be subsetting.>
mod_prss_outfile_luns	<Lun numbers for subsetting products.>
REPROCESSINGPLANNED	"further update is anticipated"
REPROCESSINGACTUAL	"reprocessed"
LinearFeatures	<Control for linear features. Value for Operations = 0>
Texture	<Control for texture. Value for Operations = 0>
B1B2	<Control for Band1/Band2. Value for Operations = 1>
DelB1B2	<Control for change in Band1/Band2. Value for Operations = 0>
ModB1B2	<Control for adjusted Band1/Band2. Value for Operations = 0>
Annual	<Control for annual. Value for Operations = 1>
NumMethods	<Control for number of methods. Value for Operations = 1>

4.67 Level 3 8-Day Snow Cover CMG (PGE67)

PGE67 performs the 8-day CMG Snow Cover processing, at MODAPS.

Purpose

PGE67 produces the L3 8-day global CMG Snow Cover product (MOD10C2) and the Land QA product (MODLM_QA).

Structure

PGE67 consists of the CMG Snow Cover 8-day process (MOD_PR10C2) and the Land QA process (MOD_PRLQA).

MODAPS Production

PGE67 is run in MODAPS Recipe AM1M_L11, which is executed every 8 days after the 8-day L3 Snow Cover processing has completed in PGE45. The L3 global CMG MOD10C2 is generated from all available tiles of MOD10A2 for the 8-day period. MOD10C2 is archived at MODAPS and exported to the PDR Server for archive and distribution at the NSIDC DAAC. The MODAPS Interim product is MODLM_QA.

Production Rules

PGE67 runs after the 8-day tiles of snow cover products (MOD10A2) from PGE45 have been produced. The operational scenario is nominally one activation every eight days. The Period Start of 8 Days Production Rule is required for PGE67. PGE67 will require a “Smart” Start of Year Production Rule at the end of each year.

The required input is MOD10A2, which has been generated only in day mode. Thus, the output product MOD10C2 is produced only in day mode. The global MOD10C2 product is generated from all of the available 317 L3 8-day Land tiles of MOD10A2. A Minimum Number of Granules, representing the number of 8-day tiles, is specified for MOD10A2 and a time-out is associated for running PGE67 if the minimum requirements are met.

The Production Rules for PGE67 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MOD10LUC

MODIS/Terra LUTs for Production of MOD10C Products

Dynamic Product Input ESDT

MOD10A2 MODIS/Terra Snow Cover 8-Day L3 Global 500m SIN GRID
(R) 1

Dynamic Product Output ESDT

MOD10C2 \MODIS/Terra Snow Cover 8-Day L3 Global 0.05Deg CMG
(A_M) (A_D) 1

Quality Control Or Diagnostic Output ESDT

MODLM_QA MODIS/Terra Land Quality Assurance (I_M) 1

Dynamic Runtime Parameters for Operations

SatelliteInstrument <Spacecraft platform for MODIS Instrument
supplied by MODAPS. Value = {AM1M, PM1M}>

ProcessingEnvironment <Computer platform on which PGE is run; determined
by the PGE perl script.>

Static Runtime Parameters for Operations

PGE67 Version	<Version of PGE67 that appears in ciList delivered with the code.>
REPROCESSING_PLANNED	"further update is anticipated"
REPROCESSING_ACTUAL	"reprocessed"

4.68 Level 3 8-Day Sea Ice Extent CMG (PGE68)

PGE68 performs the 8-day CMG Sea Ice Extent processing at MODAPS.

Purpose

PGE68 produces the 8-day global Sea Ice Extent CMG products (MOD29C2D and MOD29C2N) and the Land MODAPS QA product (MODLM_QA).

Structure

PGE68 consists of the 8-day CMG Sea Ice Extent process (MOD_PR29C2) and the Land QA process (MOD_PRLQA).

MODAPS Production

The MODIS Science Team has not yet delivered PGE68.

Production Rules

PGE68 runs after the 8-day Land tiles of Sea Ice Extent products (MOD29P2D and MOD29P2N) from PGE47 have been produced. The operational scenario is nominally one activation every eight days. The Period Start of 8 Days Production Rule is required for PGE68. PGE68 will require a “Smart” Start of Year Production Rule at the end of each year.

The required inputs are MOD29P2D and MOD29P2N, which have been produced separately in day mode and night mode. Thus, the MOD29C2D and MOD29C2N products are produced separately in day mode and night mode. The global MOD29C2D and MOD29C2N products are generated from all of the available 8-day Land tiles of MOD29P2D and MOD29P2N. A Minimum Number of Granules, representing the number of 8-day tiles, are specified for MOD29P2D and MOD29P2N and a time-out is associated for running PGE68 if the minimum requirements are met.

The Production Rules for PGE68 are:

- Period Start of 8 Days,
- “Smart” Start of Year,
- Metadata Based Query,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD29P2D	MODIS/Terra Sea Ice Extent 8-Day L3 Global 1 km EASE-Grid Day (R) *
MOD29P2N	MODIS/Terra Sea Ice Extent 8-Day L3 Global 1 km EASE-Grid Night (R) *

Dynamic Product Output ESDT

MOD29C2D	MODIS/Terra Sea Ice Extent 8-Day L3 Global 0.05Deg CMG Day (A _M) (A _D) 1
MOD29C2N	MODIS/Terra Sea Ice Extent 8-Day L3 Global 0.05Deg CMG Night (A _M) (A _D) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 2
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*The MODIS Science Team has not delivered PGE 68; the number of input files required is unavailable.

4.69 Level 3 Daily Atmosphere Zonal Tiling (PGE69)

PGE69 performs the L3 daily Atmospheric Zonal Tiling processing at MODAPS.

Purpose

PGE69 produces the L3 daily Atmosphere Zonal Tiling product (MOD08_TL) and the corresponding high resolution product (MOD08TLH).

Structure

PGE69 consists of the Daily Atmosphere Zonal Tiling processes (MOD_PR08T and corresponding high resolution process MOD_PR08TH). These processes run independently in the same PGE.

MODAPS Production

PGE69 is run in MODAPS Recipe AM1M_A2, which is executed for each zonal tile every day upon the availability of MOD04_L2, MOD05_L2, MOD06_L2 and MOD07_L2 granules covering the daily processing period. The daily zonal tile products, MOD08_TL and MOD08TLH, are Interim products at MODAPS. A maximum of 36 zonal tiles of each ESDT is produced each day.

Production Rules

PGE69 runs after the production is completed for the L2 Aerosol and Water Vapor (MOD04_L2 and MOD05_L2) from PGE04, L2 atmosphere profiles (MOD07_L2) from PGE03, and the L2 Clouds (MOD06_L2) from PGE06. The operational scenario is nominally 36 activations per day, representing the processing of one atmosphere zonal tile per PGE execution. The Period Specification Production Rule is required for PGE69 to generate the daily zonal tiled products.

MOD_PR08T and MOD_PR08TH open and read all of the 5-minute granules of input L2 aerosol, total precipitable water vapor, cloud product, and atmosphere profiles retrieved for the zonal tile, and perform the data processing to create the tiled output at standard and high resolution, respectively. These processes fill the science data arrays, write the ECS metadata, and write the MOD08_TL and MOD08TLH tiled product files. MOD04_L2, MOD05_L2, MOD06_L2 and MOD07_L2 are optional inputs. If all expected granules are available, MODAPS executes the PGE. On the order of 20 MOD04_L2 and 40 MOD05_L2, MOD06_L2 and MOD07_L2 are expected. PGE69 can be run when at least one of these files is available.

PGE69 will have 36 profiles, one for each of the zonal tiles. Tile 1 is the North Pole; Tile 36 is the South Pole. The Latitude coordinates for each of the 36 profiles will be specified to the Production System as values for a Metadata Based Query on the NorthBoundingCoordinate and SouthBoundingCoordinate for each of the input ESDTs. Only the granules of each input type whose spatial coverage overlaps the zonal tile and whose temporal coverage overlaps the specified GMT day are staged for the PGE profile being executed. The zonal tile will be a runtime parameter with the appropriate

value for each PGE69 profile. MODAPS uses the Zonal Tiling Production Rule to automate the 36 activations per day.

The Production Rules for each PGE69 profile are the following:

- Period Specification,
- Zonal Tiling,
- Metadata Based Query,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD04_L2	MODIS/Terra Aerosol 5-Min L2 Swath 10km (O) 0
MOD05_L2	MODIS/Terra Total Precipitable Water Vapor 5-Min L2 Swath 1km and 5km (O) 0
MOD06_L2	MODIS/Terra Clouds 5-Min L2 Swath 1km and 5km (O) 0
MOD07_L2	MODIS/Terra Temperature and Water Vapor Profiles 5-Min L2 Swath 5km (O) 0

At least one granule from the sum of the input ESDTs is required.

Dynamic Product Output ESDT

MOD08_TL	MODIS/Terra Atmosphere Zonal Tiling Daily L3 Latitude Zone 1Deg CMG (IM) 1
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Quality Control or Diagnostic Output ESDT

MOD08TLH	MODIS/Terra Atmosphere Zonal Tiling Daily L3 Latitude Zone 0.1Deg CMG (IM) 1
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Dynamic Runtime Parameters for Operations

Collection Start Time	<Start time for data observations>
Collection End Time	<End time for data observations>
SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M,PM1M}>
Tile to Process	< Zonal tile to process. Value = {1- 36}.>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

PGE69 VERSION	<Version of PGE69 that appears in the ciList delivered with the code>
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4.70 Level 3 8-Day Atmosphere (PGE70)

PGE70 performs the L3 8-Day Atmosphere processing at MODAPS.

Purpose

PGE70 produces L3 8-Day Aerosol Cloud Water Vapor Ozone product (MOD08_E3).

Structure

PGE70 consists of the L3 Atmosphere 8-Day process MOD_PR08E.

MODAPS Production

PGE70 is run in MODAPS Recipe AM1M_A4, which is executed every 8 days upon the availability of all the MOD08_D3 granules that are expected for coverage of this processing period. Products archived at MODAPS are the 8-Day granules of MOD08_E3 for the 8-day processing period. MODAPS exports MOD08_E3 to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

PGE70 runs after 8 days of L3 Atmosphere Daily (PGE56) outputs are completed. The operational scenario is nominally one activation every 8 days representing the processing of one cycle of daily atmosphere granules of MOD08_D3 per PGE execution. The Period Start of 8 days Production Rule is required for PGE57 to generate the atmosphere MOD08_E3 product. The PGE70 start day resets to January 1 at the start of each year. The last 8-day period of the prior year is processed using a full complement of 8 inputs.

The L3 Atmosphere 8-Day product (MOD08_E3) is created from daily MOD08_D3 file inputs. MOD_PR08E reads the MOD08_D3 files and performs the data processing on the daily granules for the 8-day cycle. This process fills the science data arrays, writes the ECS metadata, and writes the MOD08_E3 product file.

The required input is a minimum of one granule of MOD08_D3. The Production System stages all daily MOD08_D3 granules whose temporal coverage falls within the 8-day cycle. PGE70 runs if all 8 daily files are available. Otherwise the Production System waits for approval by the Science Team for manual intervention by the MODAPS Operator.

The Production Rules for PGE70 are:

- Period Start of 8 Days,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD08_D3	MODIS/Terra Aerosol Cloud Water Vapor Ozone Daily L3 Global 1Deg CMG (R) 1
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Dynamic Product Output ESDT

MOD08_E3	MODIS/Terra Aerosol Cloud Water Vapor Ozone 8-Day L3 Global 1Deg CMG (A _M) (A _D) 1
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Dynamic Runtime PARAMETERS FOR OPERATIONS

Collection Start Time	<Start time for data observations>
Collection End Time	<End time for data observations>
SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M,PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

PGEVERSION	<Version of PGE70 that appears in the ciList delivered with the code>
REPROCESSINGACTUAL	"reprocessed"
REPROCESSINGPLANNED	"further update is anticipated"
SizeMetadataEnd	None
LOCALVERSIONID	<Value of Collection Version, e.g., 004>

4.71 Level 1A Oceans Sub-setting (PGE71)

PGE71 performs the sub-setting of the MODIS L1A data at the GES DAAC.

Purpose

PGE71 produces a modified and compressed 5-minute (MOD01SS) L1A granule from each 5-minute (MOD01) L1A granule. MOD01SS granules are exported to the MODIS Oceans Team at Miami and to MODAPS for reprocessing data.

Structure

PGE71 is a csh script, which runs the L1A sub-setting process (MOD_PR01SS) and also compresses the MOD01SS file.

MODAPS Production

PGE71 Production is run at the GES DAAC after the MOD01 data is produced by PGE01. A total of 24 granules of MOD01SS are produced for each 2-hour run of PGE01 followed by PGE71. The GES DAAC exports MOD01SS to MODAPS for reprocessing data, for emergency backup processing scenarios, or for testing purposes. MOD01SS is ingested from the GES DAAC and archived for a short time at MODAPS when it is needed for reprocessing.

Production Rules

The GES DAAC processes new Level 0 data that are available from EDOS approximately every two hours. The GES DAAC runs PGE01 every 15 minutes followed by PGE71. For each 2-hours of Level 0 data, 24 granules of MOD01SS are produced. MOD01 is a required input to PGE71. There are no other data product dependencies for MOD_PR01SS.

PGE71 is a csh script that executes MOD_PR01SS and then performs a UNIX compression of the MOD01SS granule. MOD_PR01SS sets some of the bands that are not relevant to the MODIS Oceans products to fill values of -1, greatly increasing the amount of compression possible. The MOD01SS compressed files are exported to the MODIS Oceans Team at Miami and to MODAPS where they are uncompressed for use in processing of Oceans data.

The Production Rules for PGE71 are the following:

- Basic Temporal.

Data Files

Dynamic Product Input ESDT

MOD01	MODIS/Terra Raw Radiances in Counts 5-Min L1A Swath (R) 1
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Dynamic Product Output ESDT

MOD01SS	MODIS/Terra Subsetted Raw Radiances in Counts 5-Min L1A Swath (A _D) 1*
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Dynamic Runtime Parameters For Operations

SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by the data processing system. Value = {AM1M,PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; to be supplied by the data processing system.>

Static Runtime Parameters for Operations

PGEVersion	<Version of PGE71 that appears in the ciList delivered with the code>
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* Number per PGE71 execution

4.72 Level 3 16-Day Vegetation Intermediate Composite (PGE72)

PGE72 performs the L3 16-Day 250m and 500m Vegetation Intermediate Composite processing at MODAPS.

Purpose

PGE72 produces the L3 16-Day 250m Vegetation Intermediate Composite at 250m (MOD44CQ) and 500m (MOD44CH), the corresponding metadata composite (MOD44CT), and the Land QA product (MODLM_QA).

Structure

PGE72 consists of the L3 16-Day 250m and 500m Vegetation Intermediate Composite process (MOD_PR44C) and the Land QA process (MOD_PRLQA).

MODAPS Production

PGE72 runs in MODAPS Recipe AM1M_L12, which is executed every 16 days upon the availability of all of the expected L2G daily granules of Surface Reflectance, Thermal Anomalies, pointers and geolocation angles, as well as the L3 daily Land Surface Temperature granules. MODAPS runs PGE72 for each of the configured Land tiles configured in the data processing system. Products archived at MODAPS are granules of MOD44CQ and MOD44CH. MODAPS Interim products are MOD44CT and MODLM_QA. MODAPS does not export the products from PGE72 to the DAAC.

Production Rules

PGE72 runs after 16 days of L2G pointers and geoangles from PGE12, the L2G daily Surface Reflectance products from PGE11, the L3 Land Surface Temperature product from PGE16, and the L2G daily Thermal Anomalies/Fire product from PGE11 have been generated. Out of a total number of Land tiles defined over the surface of the Earth in the Sinusoidal Grid, PGE72 generates products for 286 tiles. The operational scenario is 286 activations every 16 days, representing the processing of one Land tile per PGE execution. The Period Start of 16 Days Production Rule is required for PGE72. PGE72 will require a "Smart" Start of Year Production Rule at the end of each year.

The required inputs are MODPTQKM, MODMGGAD, MOD09GQK, MODPTHKM, MOD09GHK, and MOD09GST. The optional inputs are MOD11A1 and MOD14GD.

PGE72 requires the Latitude/Longitude Tiling Production Rule. To execute PGE72, a Latitude/Longitude tile definition file must be associated with the PGE. The tile schemes containing the tile definitions are listed in Table 3-8 with the MODAPS Recipes that use them. MODAPS passes the TileID to PGE72 as a dynamic runtime parameter. Table 3-9 shows the tiling schemes used are to produce the L2G Surface Reflectance products input to PGE72.

The Production Rules for PGE72 are:

- Period Start of 16 Days,
- "Smart" Start of Year,

- Optional Inputs,
- Latitude/Longitude Tiling,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MOD44LUC	MODIS/Terra LUTs Land Sea Mask and Training Files for Production of MOD44C Products
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Dynamic Product Input ESDT

MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m SIN Grid (R) 1
MODPTQKM	MODIS/Terra Observation Pointers Daily L2G Global 250m SIN Grid (R) 1
MODMGGAD	MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid Day (R) 1
MOD09GHK	MODIS/Terra Surface Reflectance Daily L2G Global 500m SIN Grid (R) 1
MOD09GQK	MODIS/Terra Surface Reflectance Daily L2G Global 250m SIN Grid (R) 1
MOD09GST	MODIS/Terra Surface Reflectance Quality Daily L2G Global 1km SIN Grid (R) 1
MOD14GD	MODIS/Terra Thermal Anomalies/Fire Daily L2G Global 1km SIN Grid Day (O) 0
MOD11A1	MODIS/Terra Land Surface Temperature/Emissivity Daily L3 Global 1 km SIN Grid (O) 0

Dynamic Product Output ESDT

MOD44CQ	MODIS/Terra Vegetation Intermediate Composite 16-Day L3 Global 250m SIN Grid (A _M) 1
MOD44CH	MODIS/Terra Vegetation Intermediate Composite 16-Day L3 Global 500m SIN Grid (A _M) 1
MOD44CT	MODIS/Terra Vegetation Intermediate Composite Metadata 16-Day L4 Global (I _M) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 2
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Dynamic Runtime Parameters for Operations

TileID	<Tile identification number (value = 8 digit integer that specifies the specific tile within the current requested tile scheme).>
SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run;determined by the PGE perl script.>

Static Runtime Parameters for Operations

PGE72 Version	<Version of PGE72 that appears in the ciList delivered with the code>
REPROCESSINGACTUAL metadata field	"reprocessed"
REPROCESSINGPLANNED metadata field	"further update is anticipated"
COVERTTEST1	<Land Cover Comparison Test 1. Value for Operations = 15>
COVERTTEST2	<Land Cover Comparison Test 2. Value for Operations = 10>
COVERTTEST3	<Land Cover Comparison Test 3. Value for Operations = 5>
VIEWTEST1	<Land View Comparison Test 1. Value for Operations = 45>
VIEWTEST2	<Land View Comparison Test 2. Value for Operations = 55>
VIEWTEST3	<Land View Comparison Test 3. Value for Operations = 65>

4.73 Level 3 Monthly Oceans (PGE73)

PGE73 performs the L3 Oceans monthly processing at MODAPS.

Purpose

PGE73 produces the L3 Ocean, quality controlled, monthly composite of Ocean Color parameters 1 through 36 (MODOCM₀₁-MODOCM₃₆), L3 Ocean quality controlled, monthly SST parameters (MOD28M_{D1}, MOD28M_{N1}, and MOD28M_{N2}), and L3 monthly maps of these products.

Structure

PGE73 consists of the Ocean monthly time binning process (MOD_PRmtbin) and the L3 mapping processes (MOD_PRmspc and MOD_PRmmap). Figure 4-12 shows the structure of PGE73.

MODAPS Production

PGE73 is run in MODAPS Recipe AM1M-O7, which is executed every calendar month depending upon the availability of Oceans daily and weekly granules covering the monthly processing period. PGE73 executes after the completion of PGE20 and PGE54 when the Ocean daily and weekly granules MODOC{D,W}_{nn} (where nn = parameters 1 through 36) and MOD28{D,W}_{mm} (where mm = parameters D1, N1, N2) covering the monthly processing period are generated. Products from PGE73 archived at MODAPS are the Oceans monthly MODOCM_{nn} (where nn = parameters 1 through 36) and MOD28M_{mm} (where mm = parameters D1, N1, N2) and the corresponding monthly Oceans maps MO{04, 36, 1D}X{M, S, N, Q, F, 1, 2, 3}M_{pp} (where pp = parameters 1 through 36 for each Ocean Color product and D1, N1, N2, for Ocean SST). The MOD28MD2 SST product that was removed from the original set of products may be produced and archived again in the future. MODAPS exports MODOCM_{nn}, MOD28M_{mm}, and MO{04, 36, 1D}X{M, S, N, Q, F, 1, 2, 3}M_{pp} to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

PGE73 runs after the last day of the calendar month of L3 Oceans Daily (PGE20) processing and the complete set of 8-day (weekly) L3 Oceans (PGE54) processing for the calendar month has been completed. The operational scenario is nominally 39 activations every calendar month, representing the processing of one of the L3 Ocean Color monthly parameter products or one of the L3 Ocean SST monthly parameters per PGE execution. The Period Specification Production Rule is required for PGE73.

Nominally a calendar month of data from one of the following L3 Oceans daily and weekly input products are required: MODOC{D,W}_{nn} or MOD28{D,W}_{mm}. Weekly products are used in the middle of each month; daily products are used at the beginning and end of each month to round out the monthly output. The Data Days covered in the input and output monthly products need to be specified using the Data Day Production

Rule, which is a special implementation of the Runtime Parameter. For this Production Rule, MODAPS stages the input granules of the parameter being processed according to their Data Day to match the Oceans monthly output and passes the start dataday and end dataday to the PGE as Runtime Parameters. A Minimum Number of Granules for the required daily input products is specified and a time-out is associated for running PGE73 if the minimum requirements are met.

PGE73 also produces map images for each of the 39 ocean parameters. The maps for each ocean parameter include eight types of values and three resolutions or sizes. The L2 Flag Byte 3 is only produced for parameters 13 through 25.

The basic Production Rules for PGE73 are:

- Period Specification,
- Advanced Temporal,
- Data Day,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MODOCTB	MODIS/Terra Ocean Time Binner Parameters
MODOCSPC	MODIS/Terra Ocean Space Converter Parameters
MODOCMAP	MODIS/Terra Oceans Mapper Parameters

Dynamic Product Input ESDT

One of the following matching daily and weekly parameters for each PGE profile activation:

MODOCD _{nn}	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Daily L3 Global 4km ISEAG (where nn = parameters 1 through 36) (R) 1*
MOD28D _{mm}	MODIS/Terra Sea Surface Temperature QC'd Params Daily L3 Global 4km ISEAG (where mm = parameters D1, N1, N2) (R) 1
MODOCW _{nn}	MODIS/Terra Ocean Color QC'd Composite Params 1-36 8-Day L3 Global 4km ISEAG (where nn = parameters 1 through 36) (R) 1*
MOD28W _{mm}	MODIS/Terra Sea Surface Temperature QC'd Params 8-Day L3 Global 4km ISEAG (where mm = parameters D1, N1, N2) (R) 1*

Dynamic Product Output ESDT

One of the following for each PGE profile activation:

MODOCM _{nn}	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Monthly L3 Global 4km ISEAG (where nn = parameters 1 through 36) (A _M) (A _D) 1*
MOD28M _{mm}	MODIS/Terra Sea Surface Temperature QC'd Params Monthly L3 Global 4km ISEAG (Where mm = parameters D1, N1, N2) (A _M) (A _D) 1*

Map Images

MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}M_{pp}

MODIS/Terra Ocean Color and SST {Mean} Maps Monthly L3 Global {4km} CylEqDis
{Std. Dev.} {36km}
{Number} {1Deg}
{Quality}
{Common Flags}
{Flag Byte 1}
{Flag Byte 2}
{Flag Byte 3}

(Where:

M = MODIS

O = Oceans

{04, 36, 1D} = resolution and size:

04 = 4 km

36 = 36 km

1D = 1 Degree

{M, S, N, Q, F, 1, 2, 3} = values mapped:

M = Mean

S = Standard deviation

N = Number of observations

Q = Quality

F = Common flags

1 = L2 Flag Byte 1

2 = L2 Flag Byte 2

3 = L2 Flag Byte 3 (only produced for pp = 13 through 25)

M = Monthly

pp = 1 through 36 for Ocean Color parameters or D1, N1,
and N2 for SST parameters.) (A_M) (A_D) 1*

Temporary Product Output

MODOCF _{nn}	MODIS Terra Ocean Color Temporary Composite Params 1-36 Monthly L3 Global 4km ISEAG (where nn = parameters 1 through 36; Interim file used for temporary storage of monthly product in PGE73) (T _M) 26*
MOD28F _{mm}	MODIS/Terra Sea Surface Temperature Temporary Params Monthly L3 Global 4km ISEAG (where mm = parameters D1, N1, N2; Interim file used for temporary storage of monthly product in PGE73) (T _M) 26*

*per parameter

Dynamic Runtime Parameters for Operations

start dataday	<Start Day for Data Observations (yyyyddd)>
end dataday	<End Day for Data Observations (yyyyddd)>
band to map	<Parameter to process>
SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	"0"
time flag	"M"
gsfc quality	"1"
longitude, origin	"0.0"
latitude, origin	"0.0"
projection rotation	"0.0"
longitude, center	"0.0"
latitude center	"0.0"
output image width in degrees	"0.0"
output image height in degrees	"180.0"
which quality field	"D"
PGEVersion	<Version of PGE73 that appears in the ciList delivered with the code>

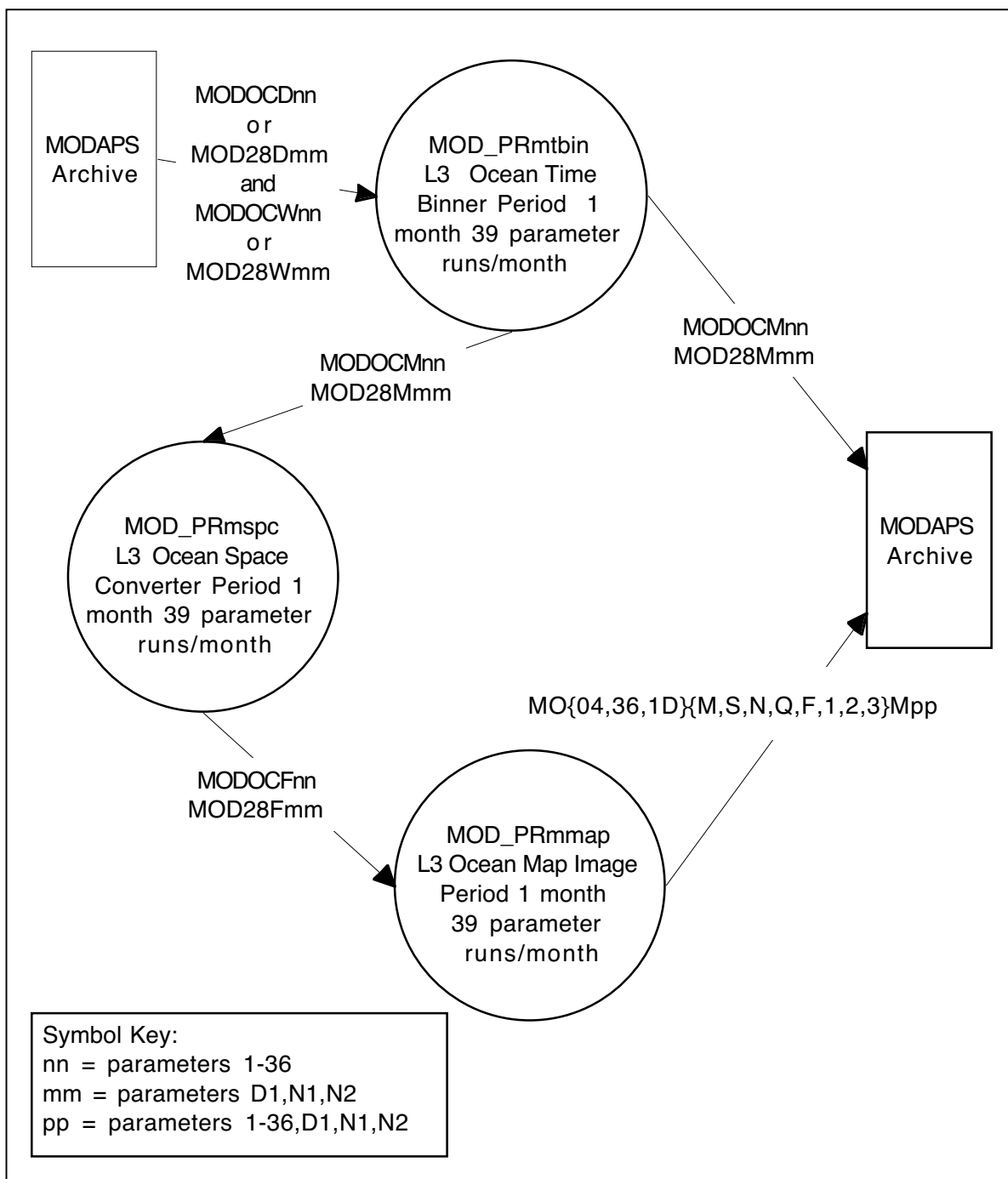


Figure 4-12 PGE73 Structure

4.74 Level 3 Yearly Oceans (PGE74)

PGE74 performs the L3 Oceans yearly processing at MODAPS.

Purpose

PGE74 produces the L3 Ocean, quality controlled, yearly composite of Ocean Color parameters 1 through 36 (MODOCN₀₁-MODOCN₃₆), L3 Ocean quality controlled, yearly SST parameters (MOD28N_{D1}, MOD28N_{N1}, and MOD28N_{N2}), and L3 yearly maps of these products.

Structure

PGE74 consists of the Ocean yearly time binning process (MOD_PRmtbin) and the L3 mapping processes (MOD_PRmshpc and MOD_PRmmap). Figure 4-13 shows the structure of PGE74.

MODAPS Production

PGE74 is run in MODAPS Recipe AM1M_O8, which is executed every calendar year depending upon the availability of Oceans monthly granules covering the monthly processing period. PGE74 executes after the completion of PGE73 when the Ocean monthly granules MODOCM_{nn} (where nn = parameters 1 through 36) and MOD28M_{mm} (where mm = parameters D1, N1, N2) covering the yearly processing period are generated. Products from PGE74 archived at MODAPS are the Oceans yearly MODOCN_{nn} (where nn = parameters 1 through 36) and MOD28N_{mm} (where mm = parameters D1, N1, N2) and the corresponding yearly Oceans maps MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}N_{pp} (where pp = parameters 1 through 36 for each Ocean Color product and D1, N1, N2, for Ocean SST). The MOD28ND2 SST product that was removed from the original set of products may be produced and archived again in the future. MODAPS exports MODOCN_{nn}, MOD28N_{mm}, and MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}N_{pp} to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

PGE74 runs after the last L3 Oceans Monthly (PGE73) processing has been completed for the year. The operational scenario is nominally 39 activations every calendar year, representing the processing of one of the L3 Ocean Color yearly parameter products or one of the L3 Ocean SST yearly parameters per PGE execution. The Period Specification Production Rule is required for PGE74.

The Data Days covered in the input and output yearly products need to be specified using the Data Day Production Rule, which is a special implementation of the Runtime Parameter. For this Production Rule, MODAPS stages the input granules of the parameter being processed according to their Data Day to match the Oceans yearly output and passes the start dataday and end dataday to the PGE as Runtime Parameters. A Minimum Number of Granules for the required daily input products is

specified and a time-out is associated for running PGE74 if the minimum requirements are met.

PGE74 also produces map images for each of the 39 ocean parameters. The maps for each ocean parameter include eight types of values and three resolutions or sizes. The L2 Flag Byte 3 is only produced for parameters 13 through 25.

The Production Rules for PGE74 are:

- Period Specification,
- Advanced Temporal,
- Data Day,
- Runtime Parameters,
- Minimum Number of Granules.

Data Files

Static Input ESDT

MODOCTB	MODIS/Terra Ocean Time Binner Parameters
MODOCSPC	MODIS/Terra Ocean Space Converter Parameters
MODOCMAP	MODIS/Terra Oceans Mapper Parameters

Dynamic Product Input ESDT

One of the following monthly parameters for each PGE profile activation:

MODOCM_{nn}	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Monthly L3 Global 4km ISEAG (where nn = parameters 1 through 36) (R) 1*
MOD28M_{mm}	MODIS/Terra Sea Surface Temperature QC'd Params Monthly L3 Global 4km ISEAG (where mm = parameters D1, N1, N2) (R) 1

Dynamic Product Output ESDT

One of the following for each PGE profile activation:

MODOCN_{nn}	MODIS/Terra Ocean Color QC'd Composite Params 1-36 Yearly L3 Global 4km ISEAG (where nn = parameters 1 through 36) (A_M) (A_D) 1*
MOD28N_{mm}	MODIS/Terra Sea Surface Temperature QC'd Params Yearly L3 Global 4km ISEAG (Where mm = parameters D1, N1, N2) (A_M) (A_D) 1*

Map Images

MO{04, 36, 1D}{M, S, N, Q, F, 1, 2, 3}N_{pp}

MODIS/Terra Ocean Color and SST {Mean} Maps Yearly L3 Global {4km} CylEqDis
 {Std. Dev.} {36km}
 {Number} {1Deg}
 {Quality}
 {Common Flags}
 {Flag Byte 1}
 {Flag Byte 2}
 {Flag Byte 3}

(Where:

M = MODIS

O = Oceans

{04, 36, 1D} = resolution and size:

04 = 4 km

36 = 36 km

1D = 1 Degree

{M, S, N, Q, F, 1, 2, 3} = values mapped:

M = Mean

S = Standard deviation

N = Number of observations

Q = Quality

F = Common flags

1 = L2 Flag Byte 1

2 = L2 Flag Byte 2

3 = L2 Flag Byte 3 (only produced for pp = 13 through 25)

N = Yearly

pp = 1 through 36 for Ocean Color parameters or D1, N1,
 and N2 for SST parameters.) (A_M) (A_D) 1*

Temporary Product Output

MODOCFnn

MODIS Terra Ocean Color Temporary Composite Params 1-36
 Yearly L3 Global 4km ISEAG (where nn = parameters 1 through
 36; Interim file used for temporary storage of monthly product in
 PGE74) (T_M) 26*

MOD28F_{mm}

MODIS/Terra Sea Surface Temperature Temporary Params
 Yearly L3 Global 4km ISEAG (where mm = parameters D1, N1,
 N2; Interim file used for temporary storage of monthly product in
 PGE74) (T_M) 26*

*per parameter

Dynamic Runtime Parameters for Operations

start dataday <Start Day for Data Observations (yyyyddd)>

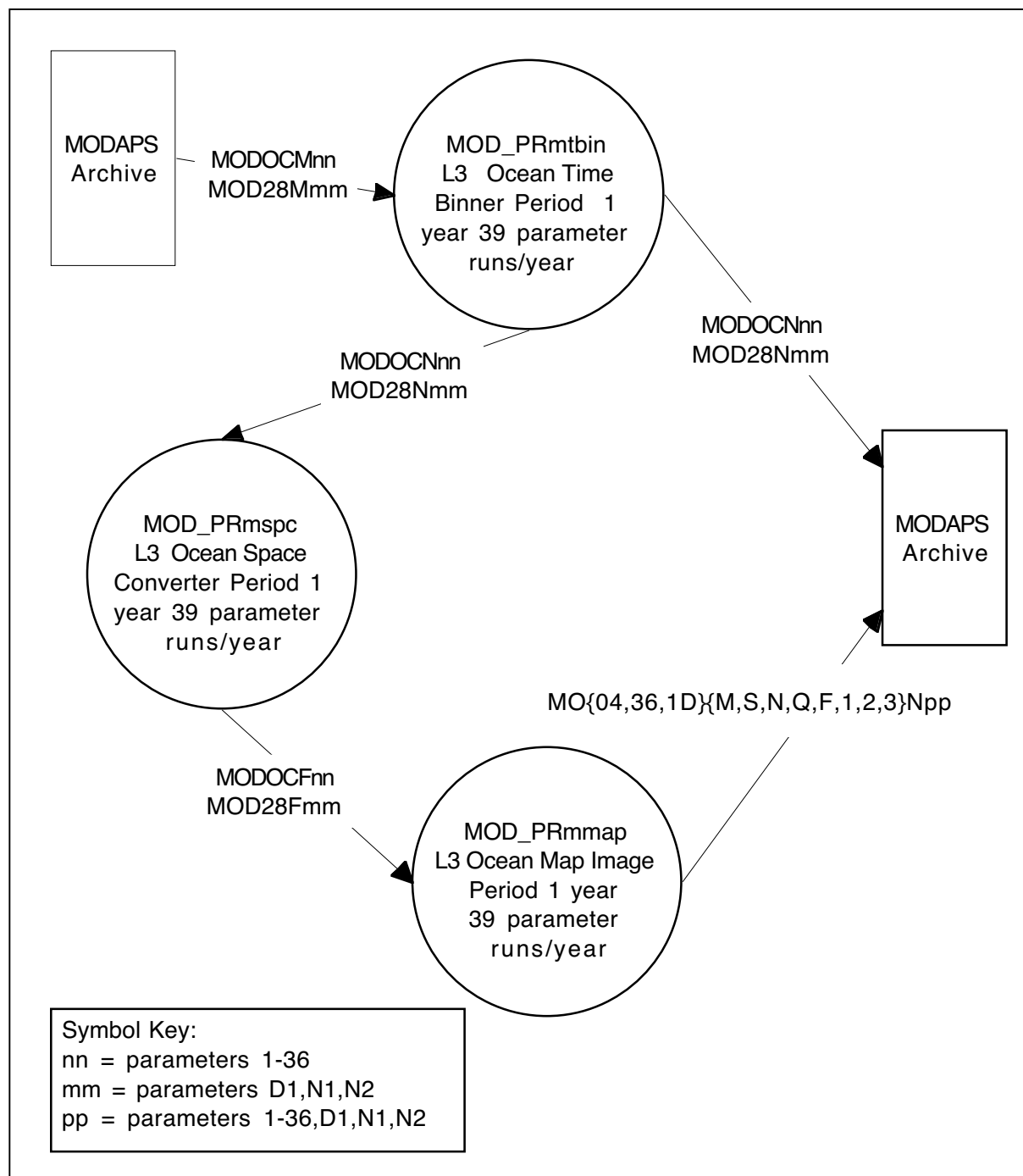
end dataday <End Day for Data Observations (yyyyddd)>

band to map <Parameter to process>

SatelliteInstrument	<Space craft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	"0"
time flag	"M"
gsfc quality	"1"
longitude, origin	"0.0"
latitude, origin	"0.0"
projection rotation	"0.0"
longitude, center	"0.0"
latitude center	"0.0"
output image width in degrees	"0.0"
output image height in degrees	"180.0"
which quality field	"D"
PGEVersion	<Version of PGE74 that appears in the ciList delivered with the code>

**Figure 4-13 PGE74 Structure**

4.75 Level 3 Daily Land Surface Reflectance CMG (PGE75)

PGE75 performs processing for L3 Daily Land Surface Reflectance CMG processing at MODAPS.

Purpose

PGE75 produces the L3 daily Surface Reflectance CMG product (MOD09CMG) and the Land QA product (MODLM_QA).

Structure

PGE75 consists of the Surface Reflectance daily CMG process (MOD_PR09C) and the Land QA process (MOD_PRLQA).

MODAPS Production

PGE75 runs in MODAPS Recipe AM1M_L7, which is executed once every day upon the availability of all of the expected orbital granules of Surface Reflectance from PGE11 for the day. The product archived at MODAPS is the daily MOD09CMG. The MODAPS Interim product is MODLM_QA. MODAPS exports MOD09CMG to the PDR Server for archive and distribution at the LP DAAC.

Production Rules

PGE75 runs after all of the L2 orbital granules of Surface Reflectance for the current processing day have been produced. The required inputs are the orbital MOD09IDN, MOD09IDS, and MOD09IDT. The Period Specification Production Rule is specified for PGE75. After a specified wait-time for all input granules to be available, PGE75 is run if a specified minimum number of granules of each ESDT have been made for the day.

The Production Rules for PGE75 are:

- Period Specification,
- Minimum Number of Granules,
- Runtime Parameters.

Data Files

Dynamic Product Input ESDT

MOD09IDN	MODIS/Terra Interim Surface Reflectance North Polar Region 1 Orbit L3 5km CMG	(R)	1*
MOD09IDS	MODIS/Terra Interim Surface Reflectance South Polar Region 1 Orbit L3 5km CMG	(R)	1*
MOD09IDT	MODIS/Terra Interim Surface Reflectance Non-Polar Region 1 Orbit L3 5km CMG	(R)	1*

Dynamic Product Output ESDT

MOD09CMG	MODIS/Terra Surface Reflectance Daily L3 Global 0.05Deg CMG (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
----------	--

* Minimum number of granules required.

Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL metadata field	"reprocessed"
REPROCESSINGPLANNED metadata field	"further update is anticipated"
PGE Version number	<Version of PGE75 that appears in the ciList delivered with the code>

4.76 Level 1 Daily Ephemeris Predictor (PGE76)

PGE76 performs the ephemeris prediction for MODIS Oceans processing.

Purpose

Using one 2-hour Terra or daily Aqua ephemeris file, PGE76 produces a set of daily predicted ephemeris files for the current day and three subsequent days for use in MODIS Oceans processing.

Structure

PGE76 consists of the ephemeris predictor process (MOD_PRpred) which includes the ECS orbsim utility.

MODAPS Production

PGE76 is run by MODAPS Eph Recipe once a day after ingesting the Terra ephemeris files (AM1EPHN0) or Aqua ephemeris file (PM1EPHND) from the GES DAAC to produce a daily ephemeris file for the current input day and predicted daily ephemeris files for three subsequent days after the current day. The 2-hour Terra ephemeris file starting at noon is preferred as the input to PGE76 for Terra processing; but any 2-hour file for the current day may be used. The Terra products are AM1EPHH for the current day and AM1EPHH1, AM1EPHH2, and AM1EPHH3 for the three subsequent days. The Aqua products are PM1EPHH for the current day and PM1EPHH1, PM1EPHH2, and PM1EPHH3 for the three subsequent days. MODAPS archives the four predicted files each day for use in the Oceans PGE09 and PGE10.

For the next processing day, a new set of current and predicted ephemeris files are written, but the previous files are retained. For each day of processing PGE09 and PGE10, MODAPS stages the current day of AM1EPHH or PM1EPHH, the three previous days of AM1EPHH or PM1EPHH, and the three predicted AM1EPH{H1,H2,H3} or PM1EPH{H1,H2,H3}.

Production Rules

PGE76 runs after the 12 Noon 2-hour Terra or Daily Aqua ephemeris file is ingested by MODAPS from the GES DAAC. The operational scenario is nominally one-activation per day for each of the two spacecraft ephemeris files. If the 12 GMT (Noon) Terra ephemeris file is unavailable, any other file for the current day is used. The Aqua processing uses the 24-hour (daily) ephemeris valid for 12 GMT (Noon). The script for PGE76 runs the MOD_PRpred process which in turn uses the ECS orbsim utility to produce the predicted ephemeris files. One execution of PGE76 always produces an ephemeris file to match the current day. The differences in the output predicted ephemeris files are explained in the above MODAPS Production.

The basic Production Rules for PGE76 are the following:

- Basic Temporal,
- Advanced Temporal,
- Runtime Parameters.

Data Files**Dynamic Product Input ESDT**

AM1EPHN0 MODIS/Terra Spacecraft Ephemeris Native Format
2-Hr L1 (R) 1

Or

PM1EPHND MODIS/Aqua Spacecraft Ephemeris Native Format
Daily L1 (R) 1

Dynamic Product Output ESDT

AM1EPHH MODIS/Terra Current Day Predicted Ephemeris Daily (A_M) 1

AM1EPHH1 MODIS/Terra Predicted Ephemeris 1 Daily (A_M) 1

AM1EPHH2 MODIS/Terra Predicted Ephemeris 2 Daily (A_M) 1

AM1EPHH3 MODIS/Terra Predicted Ephemeris 3 Daily (A_M) 1

Or

PM1EPHH MODIS/Aqua Current Day Predicted Ephemeris Daily (A_M) 1

PM1EPHH1 MODIS/Aqua Predicted Ephemeris 1 Daily (A_M) 1

PM1EPHH2 MODIS/Aqua Predicted Ephemeris 2 Daily (A_M) 1

PM1EPHH3 MODIS/Aqua Predicted Ephemeris 3 Daily (A_M) 1

Dynamic Runtime Parameters for Operations

SatelliteInstrument <Space craft platform for MODIS Instrument supplied
by MODAPS. Value = {AM1M,PM1M}>

ProcessingEnvironment <Computer platform on which PGE is run; determined
by the PGE perl script.>

4.77 Level 4 Daily Evapo-transpiration Fraction (PGE77)

PGE77 performs the Aqua L4 Daily Land Evapo-transpiration Fraction processing at MODAPS.

Purpose

PGE77 produces the Aqua L4 Daily Land Evapo-transpiration Fraction product (MYD16A1).

Structure

PGE77 consists of the L4 Land Daily Evapo-transpiration Fraction process (MOD_PR16A1) and the Land QA process (MOD_PRLQA).

MODAPS Production

The MODIS Science Team has not yet delivered PGE77. PGE77 will be run only in Aqua data processing. Products archived at MODAPS are granules of MYD16A1 covering the daily processing period. Interim products are MODLM_QA. There are no plans to export MYD16A1 to the DAAC.

Production Rules

The Production Rules for PGE77 have not been delivered by the Land SCF.

Data Files

Dynamic Product Input ESDT

No information on input products is available.

Dynamic Product Output ESDT

MYD16A1	MODIS/Terra Evapo-transpiration Fraction Daily L4 Global 1km SIN Grid (A _M) 1
---------	--

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
----------	--

Dynamic Runtime Parameter for Operations

Collection Start Time	< Start time for data observations>
Collection End Time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL
REPROCESSINGPLANNED
PGEVERSION

“processed once”

“further update is anticipated”

<Version of PGE77 that appears in the ciList
delivered with the code>

4.78 Level 4 8-Day Evapo-transpiration Fraction (PGE78)

PGE78 performs the Aqua L4 8-Day Land Evapo-transpiration Fraction processing at MODAPS.

Purpose

PGE78 produces the Aqua L4 8-Day Land Evapo-transpiration Fraction product (MYD16A2).

Structure

PGE78 consists of the L4 8-Day Land Land Evapo-transpiration Fraction process (MOD_PR16A2) and the Land QA process (MOD_PRLQA).

MODAPS Production

The MODIS Science Team has not yet delivered PGE78. PGE78 will be run only in Aqua data processing. Products archived at MODAPS are granules of MYD16A2 covering the 8-day processing period. Interim products are MODLM_QA. There are no plans to export MYD16A2 to the DAAC.

Production Rules

The Production Rules for PGE78 have not been delivered by the Land SCF.

Data Files

Dynamic Product Input ESDT

No information on input products is available.

Dynamic Product Output ESDT

MYD16A2	MODIS/Terra Evapo-transpiration Fraction 8-Day L4 Global 1km SIN Grid (A _M) 1
---------	--

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
----------	--

Dynamic Runtime Parameter for Operations

Collection Start Time	<Start time for data observations>
Collection End Time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL
REPROCESSINGPLANNED
PGEVERSION

“processed once”

“further update is anticipated”

<Version of PGE77 that appears in the ciList
delivered with the code>

4.79 Level 1B Subsetted Calibrated Radiances Cutouts (PGE79)

PGE79 is the third step in the L2 and L3 space-binning Ocean Color and Sea Surface Temperature processing of the MODIS data executed at MODAPS.

Purpose

PGE79 produces the MODIS L1B subsetted Calibrated Radiances cutouts (MOC021KM).

Structure

PGE09 consists of the L1B subsetter process (MOD_PRmsubl).

MODAPS Production

PGE79 is run in MODAPS Recipe AM1M_O1 for Terra, which is executed daily upon the availability of MOD021KM and MOD03 for the processing period. PGE79 produces subsetted Level-1B Calibrated Radiances cutouts over validation sites, both fixed diagnostic sites and variable in-situ sites such as buoys or ship cruises. The cutout Level-1B products correspond to the MOCOCL2, MOCOCL2A, MOCOCL2B, and MOCOCQC products from PGE09 and the MOC28L2 and MOC28QC products from PGE10. The cutout files contain geolocation and spatial subsets of the original Level-1B SDSs for regions surrounding specified sites. MODAPS stages the cutout files on an FTP site. Selected L1B cutout files will be packaged with the corresponding MODIS Ocean Color cutout files for about 38 diagnostic sites and archived at the GES DAAC.

Production Rules

PGE79 runs once for each input 5-minute MODIS L1B granule to generate cutout products. The required inputs are MOD021KM and MOD03. PGE79 requires that the L1B granule have the Nadir Pointing metadata attribute set to "Y" for "Yes". The operational scenario is nominally 288 activations per day, representing one execution for each set of 5-minute input granules. PGE79 produces cutout Level-1B files for regions surrounding specified diagnostic and validation sites. The cutout sites along with latitude, longitude, sampling size, and sampling days of year are stored in the baselined LocationList_Fixed.txt and LocationList_Variable.txt files in the shared coefficient directory. These files may be updated frequently to permit timely updates of sampling regions. In addition, the following baselined files contain information on what scientific datasets (SDSs) are to be sampled: SDSListL1B.txt. This file corresponds to the SDSs in MOD021KM.

The Production Rules for PGE09 are:

- Basic Temporal,
- Metadata Based Query.

Data Files**Static Input ESDT**

MOD28LST	MODIS/Terra Ocean SDS List and Cutout Site Location List
----------	--

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1

Dynamic Product Output ESDT

MOC021KM	MODIS/Terra Calibrated Radiance Subsetted Cutouts 5-Min L1B Swath 1km (A _M) 1
----------	--

Dynamic Runtime Parameters for Operations

start dataday	<Start Day for Data Observations(yyyyddd)>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

SMFLOG_SCREEN Switch	0
subsamplex	0
subsampley	0
PGEVersion	<Version of PGE79 that appears in the CiList delivered with the code>

4.80 Level 3 Intermediate Daily Filtered Surface Reflectance (PGE80)

PGE80 performs the daily L3 Intermediate Filtered Surface Reflectance processing at MODAPS.

Purpose

PGE80 produces the L3 Land Intermediate Filtered Surface Reflectance products (MODHDFSR and MODQDFSR). It also produces the Land QA product (MODLM_QA).

Structure

PGE80 consists of the L3 Intermediate Filtered Surface Reflectance process (MOD_PRDFSR) and the Land QA process (MOD_PRLQA).

MODAPS Production

PGE80 runs in MODAPS Recipe AM1M_L5, which is executed every day upon the availability of L2G Pointers, Geolocation Angles, and Surface Reflectance granules covering the daily processing period. Products currently archived at MODAPS are the daily L3 MODHDFSR and MODQDFSR. No products from PGE80 are archived at the DAACs. MODAPS Interim products are granules of MODLM_QA .

Production Rules

PGE80 processes the Land Intermediate Filtered Surface Reflectance at 250 m and 500 m resolutions. A runtime parameter is set in the PCF to produce the 250 m, the 500 m, or both products.

If disk resources are insufficient for global processing, MODAPS has tile schemes that process high-priority tile regions from North America, South America, Africa, and Asia. Land Surface Reflectance products are made only in day mode. PGE80 currently uses a tile scheme containing 36 tiles.

Out of a total number of Land tiles over the surface of the Earth defined in the Sinusoidal projection PGE80 generates products for 36 selected tiles. Each PGE80 profile runs once per tile per day after the L2G Pointer (PGE12) and L2G Surface Reflectance (PGE13) has completed. The Period Specification Production Rule is used to activate PGE80. The current operational scenario uses a tile scheme that initiates 36 activations per day, representing the processing of one tile of filtered land surface reflectance per PGE execution. The Land QA Process MOD_PRLQA is run when MOD_PRDFSR has completed.

PGE80 requires the Latitude/Longitude Tiling Production Rule. To execute PGE80, a Latitude/Longitude tile definition file must be associated with the PGE during registration at MODAPS. For the MODIS SDPS, tile schemes in the Sinusoidal Projection have been defined and registered in MODAPS. These tile schemes are listed in Table 3-8 with the MODIS Recipes that use them. For each individual execution, MODAPS will create an instantiation of PGE80 with a particular TileID.

The required inputs for PGE80 profile are matching granules of the surface reflectance (MOD09GHK, MOD09GQK, and MOD09GST), the Geolocation Angles (MODMGGAD), and the pointers (MODPTHKM and MODPTQKM). The number of granules overlapping a particular tile for a daily PGE run may be as few as one or even zero. If there are zero granules, the PGE is not run for that tile.

The basic Production Rules for PGE80 are:

- Period Specification,
- Latitude/Longitude Tiling ,
- Minimum Number of Granules,
- Runtime Parameters.

Data Files

Dynamic Product Input ESDT

MODMGGAD	MODIS/Terra Geolocation Angles Daily L2G Global 1km SIN Grid Day (R) 1
MOD09GHK	MODIS/Terra Surface Reflectance Daily L2G Global 500m SIN Grid (R) 1
MOD09GQK	MODIS/Terra Surface Reflectance Daily L2G Global 250m SIN Grid (R) 1
MOD09GST	MODIS/Terra Surface Reflectance Quality Daily L2G Global 1km SIN Grid (R) 1
MODPTHKM	MODIS/Terra Observation Pointers Daily L2G Global 500m SIN Grid (R) 1
MODPTQKM	MODIS/Terra Observation Pointers Daily L2G Global 250m SIN Grid (R) 1

Dynamic Product Output ESDT

MODHDFSR	MODIS/Terra Intermediate Filtered Surface Reflectance Daily L3 Global 500m SIN Grid (A _M) 1
MODQDFSR	MODIS/Terra Intermediate Filtered Surface Reflectance Daily L3 Global 250m SIN Grid (A _M) 1

Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance	(IM)	2*
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* Maximum of 2 per run

Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

SizeMBECSDataGranule	<File size in MB>
REPROCESSINGACTUAL metadata field	"reprocessed"
REPROCESSINGPLANNED metadata field	"further update is anticipated"
Processing option	<Options to select products: qkm hkm. Value for operations = qkm,hkm>
PGE80 Version	<Version of PGE80 that appears in the ciList delivered with the code>
Mask Version	< L2G Mask Version option.. Value for operations = 0>
L2G NOBS	<Number of L2G observations to process. Value for operations = 6>
500m bands	<List of 500m bands to process. Value for operations = 1,2,3,4,5,6,7>
250m bands	<List of 250m bands to process. Value for operations = 1,2>

4.81 Level 3 Daily Clear Sky Radiance 8-Day Composite (PGE81)

PGE81 performs the L3 Atmosphere Clear Sky Radiance 8-day Composite processing at MODAPS.

Purpose

PGE81 produces the L3 Atmosphere Clear Sky Radiance 8-day Composite (MODCSR_8).

Structure

PGE81 consists of the L3 Atmosphere Clear Sky Radiance 8-day Composite process (MOD_PRCSR8).

MODAPS Production

The MODIS Atmosphere Group has not yet completed PGE81. It is in the development stage at MODIS SDST. Current plans are to run PGE81 at MODAPS in Recipe AM1M_A7. The MODCSR_8 product will be archived at MODAPS. MODAPS will export MODCSR_8 to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

PGE81 will run when the daily granule of MODCSR_D has been generated by PGE55. The operations scenario is one activation per day. Input MODCSR_D products are taken from the current day and the previous 7 data days, a maximum of 8 files. A minimum number of daily files will also be specified. The new MODCSR_8 terminating on day “x” is to be used as input to L2 processing on day “x+2”.

The Production Rules for PGE81 are:

- Period Specification,
- Advanced Temporal,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MODCSR_D	MODIS/Terra Clear Sky Radiance Statistics Daily L3 Global 25km Equal Area (R)	1
MODCSR_8	MODIS/Terra Clear Sky Radiance 8-Day Composite Daily L3 Global 25km Equal Area (R)	1

Dynamic Product Output ESDT

MODCSR_8	MODIS/Terra Clear Sky Radiance 8-Day Composite Daily L3 Global 25km Equal Area (A_M) (A_D)	1
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Dynamic Runtime Parameter for Operations

Collection Start Time	<Start time for data observations>
Collection End Time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL	"processed once"
REPROCESSINGPLANNED	"further update is anticipated"
PGEVERSION	<Version of PGE81 that appears in the ciList delivered with the code>

4.82 Level 3 16-Day Nadir Bi-Directional Reflectance Distribution-Adjusted Reflectance CMG (PGE82)

PGE82 performs the 16-day CMG Nadir Bi-Directional Reflectance Distribution Function (BRDF)-Adjusted Reflectance processing at MODAPS.

Purpose

PGE82 produces the CMG 16-day Nadir BRDF-Adjusted Reflectance product (MOD43C3) and the Land QA product (MODLM_QA).

Structure

PGE82 consists of the CMG Nadir BRDF-Adjusted Reflectance 16-day process (MOD_PR43C3) and the Land QA process (MOD_PRLQA).

MODAPS Production

PGE82 is run in MODAPS Recipe AM1M_L13, which is executed every 16 days after the 16-day Nadir BRDF-Adjusted Reflectance processing has completed in PGE23. The global CMG MOD43C3 is generated from all available tiles of MOD43B4. MOD43C3 is archived at MODAPS and exported to the PDR Server for archive and distribution at the LP DAAC. The MODAPS Interim product is MODLM_QA.

Production Rules

PGE82 runs after the 16-day tiles of L3 Nadir BRDF-Adjusted Reflectance (MOD43B4) from PGE23 have been produced. The operational scenario is nominally one activation every 16 days. The Period start of 16 Days Production Rule is required for PGE82. PGE82 will require a "Smart" Start of Year Production Rule at the end of each year.

The required input is MOD43B4, which has been generated only in day mode. Thus, the output product MOD43C3 is produced only in day mode. The global MOD43C3 product is generated from all of the available 16-day land tiles of MOD43B4 for the 16-day period. A Minimum Number of Granules, representing the number of 16-day tiles, is specified for MOD43B4 and a time-out is associated for running PGE82 if the minimum requirements are met.

The basic Production Rules for PGE82 are:

- Period Start of 16 Days,
- "Smart" Start of year,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD43B4

MODIS/Terra Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 1km SIN Grid (R) 1

Dynamic Product Output ESDT

MOD43C3	MODIS/Terra Nadir BRDF-Adjusted Reflectance 16-Day L3 Global 0.05Deg CMG	(A _M)	(A _D)	1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance	(I _M)	1
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Dynamic Runtime Parameters for Operations

SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

PGE82 Version	<Version of PGE82 that appears in the ciList delivered with the code>
REPROCESSING_PLANNED	"further update is anticipated"
REPROCESSING_ACTUAL	"reprocessed"

4.83 Level 2 Joint Atmosphere Products (PGE83)

PGE83 performs a L2 subsetting function in MODAPS to generate the Atmosphere L2 Joint Product.

Purpose

PGE83 produces the L2 Aerosol Cloud Water Vapor Joint Atmosphere product (MODATML2).

Structure

PGE83 consists of the Atmosphere L2 subset process (MOD_PRATML2).

MODAPS Production

PGE83 is run in MODAPS Recipe AM1M_A1, which is executed every 5 minutes upon the availability of MOD03, MOD06_L2, MOD07_L2, MOD35_L2, MOD04_L2, and MOD05_L2. If all of these are available, MODAPS runs both day and night time periods. Otherwise, production is delayed until the missing ESDT products have been recovered or determined to be not available for that 5-minute period. At this point MODAPS stages all available input granules and runs PGE83 only if both MOD03 and MOD06_L2 are available.

Products archived at MODAPS are granules of MODATML2 covering the 5-minute processing period. MODAPS archives the MODATML2 products. MODAPS exports MODATML2 to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

PGE83 runs when all of the Atmosphere processing has completed for the 5-minute period. The operations scenario is approximately 288 activations per day with the output of one granule per 5-minute period. The required input products for both day and night runs are granules of MOD03 and MOD06_L2. The optional inputs are MOD07_L2, MOD35_L2, MOD04_L2, and MOD05_L2.

PGE83 writes SDS arrays in the MODATML2 product for each of the input data parameters. PGE04 generates both MOD04_L2 and MOD05_L2. The MOD04_L2 aerosol product is only generated for scenes with a minimum solar zenith angle less than a specified threshold that is currently set to 72 degrees. The aerosol parameter will thus be missing for night granules and for most granules straddling the terminators. MOD05_L2 available and MOD04_L2 not available implies that the solar illumination of the scene does not satisfy the PGE04 processing requirement for making MOD04_L2. In this case PGE83 should be run without MOD04_L2.

The Production Rules for PGE83 are:

- Basic Temporal,
- Optional Inputs.

Data Files

Dynamic Product Input ESDT

MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1
MOD06_L2	MODIS/Terra Clouds 5-Min L2 Swath 1km and 5km R) 1
MOD04_L2	MODIS/Terra Aerosol 5-Min L2 Swath 10km (O) 0
MOD05_L2	MODIS/Terra Total Precipitable Water Vapor 5-Min L2 Swath 1km and 5km (O) 0
MOD07_L2	MODIS/Terra Temperature and Water Vapor Profiles 5-Min L2 Swath 5km (O) 0
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km (O) 0

Dynamic Product Output ESDT

MODATML2	MODIS/Terra Aerosol Cloud Water Vapor Subset 5-Min L2 Swath 5km and 10km CMG (A _M) (A _D) 1
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Dynamic Runtime Parameter for Operations

Collection Start Time	<Start time for data observations>
Collection End Time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL	"reprocessed"
REPROCESSINGPLANNED	"further update is anticipated"
PGEVERSION	<Version of PGE83 that appears in the ciList delivered with the code>

4.84 Level 3 Daily Sea Ice Extent and Ice Surface Temperature (PGE84)

PGE84 performs the L3 Daily Land Sea Ice Extent and Ice Surface Temperature (IST) processing at MODAPS.

Purpose

PGE84 produces the L3 Daily Land Sea Ice Extent and IST product (MOD29E1D).

Structure

PGE84 consists of the L3 Land Sea Ice Extent and IST process (MOD_PR29E1) and the Land QA process (MOD_PRLQA).

MODAPS Production

PGE84 is run in MODAPS Recipe AM1M_L21, which is executed daily upon the availability of the daily MOD29P1D EASE-Grid tiles. Products archived at MODAPS are granules of MOD29E1D covering the daily processing period. MODLM_QA is an interim product. MODAPS exports MOD29E1D to the PDR Server for archive and distribution at the NSIDC DAAC.

Production Rules

PGE84 runs when the daily 500m Sea Ice Extent processing (PGE44) has completed. The operations scenario is one activation per day. The required input products are all of the EASE-Grid tiled granules of daytime MOD29P1D available for the day. The PGE will run with 1 to 722 input MOD29P1D tiles. MOD29E1D is archived at MODAPS and exported to the NSIDC DAAC.

The Production Rules for PGE84 are:

- Period Specification,
- Minimum Number of Granules.

Data Files

Dynamic Product Input ESDT

MOD29P1D	MODIS/Terra Sea ice Extent Daily L3 Global 1km EASE-Grid Day (R) 1
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Dynamic Product Output ESDT

MOD29E1D	MODIS/Terra Sea Ice Extent and IST Daily L3 Global 4km EASE-Grid Day (A _M) (A _D) 1
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Quality Control or Diagnostic Output ESDT

MODLM_QA	MODIS/Terra Land Quality Assurance (I _M) 1
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Dynamic Runtime Parameter for Operations

Collection Start Time	< Start time for data observations>
Collection End Time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL	"processed once"
REPROCESSINGPLANNED	"further update is anticipated"
PGEVERSION	<Version of PGE84 that appears in the ciList delivered with the code>

4.85 Level 2 Clear Sky Radiance Statistics (PGE85)

PGE85 performs the L2 Atmosphere Clear Sky Radiance Statistics processing at MODAPS.

Purpose

PGE85 produces the L2 Atmosphere Clear Sky Radiance Statistics (MODCSR_G).

Structure

PGE85 consists of the L2 Atmosphere Clear Sky Radiance Statistics process (MOD_PRCSRG).

MODAPS Production

The MODIS Atmosphere Group has not yet completed PGE85. It is in the development stage at MODIS SDST. Current plans are to run PGE85 at MODAPS in Recipe AM1M_A1b . The MODCSR_G product will be archived at MODAPS. MODAPS will export MODCSR_G to the PDR Server for archive and distribution at the GES DAAC.

Production Rules

PGE85 will run after PGE01, PGE02, and PGE03 processing have completed for the 5-minute period and the MOD03, MOD021KM, and MOD35_L2 granules have been ingested at MODAPS from the GES DAAC. The operations scenario is nominally 288 activations per day, one for each generation of a 5-minute granule of MODCSR_G. The required input products are MOD03, MOD021KM, and MOD35_L2 granules from PGE01, PGE02, and PGE03, respectively.

The Production Rule for PGE85 is:

- Basic Temporal.

Data Files

Dynamic Product Input ESDT

MOD021KM	MODIS/Terra Calibrated Radiances 5-Min L1B Swath 1km (R) 1
MOD03	MODIS/Terra Geolocation Fields 5-Min L1A Swath 1km (R) 1
MOD35_L2	MODIS/Terra Cloud Mask and Spectral Test Results 5-Min L2 Swath 250m and 1km (R) 1

Dynamic Ancillary Product Input ESDT

GDAS_0ZF	NCEP GDAS Meteorological Data GRIB Format 6-Hr L3 Global 1Deg Lat/Lon (R) 1
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Dynamic Product Output ESDT

MODCSR_G	MODIS/Terra Clear Sky Radiance Statistics Index 25km Global Grid 5-Min L2 Swath (A _M) or (A _D) 1
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Dynamic Runtime Parameter for Operations

Collection Start Time	<Start time for data observations>
Collection End Time	<End time for data observations>
SatelliteInstrument	<Spacecraft platform for MODIS Instrument supplied by MODAPS. Value = {AM1M, PM1M}.>
ProcessingEnvironment	<Computer platform on which PGE is run; determined by the PGE perl script.>

Static Runtime Parameters for Operations

REPROCESSINGACTUAL	"processed once"
REPROCESSINGPLANNED	"further update is anticipated"
PGEVERSION	<Version of PGE85 that appears in the ciList delivered with the code>